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I.

PRESIDENT'S ADDRESS.

PRESENT-DAY NEEDS OF AN ORTHOPEDIC SERVICE.*

BY HENRY LING TAYLOR, M. D., NEW YORK CITY.

It is a pleasure as well as a privilege to greet you in this central city of the continent and to inaugurate the scientific sessions of our twenty-second annual meeting. Starting as an aggregation of individuals our Association has become year by year more firmly knit in common aims and mutual esteem, and through its growth in practical efficiency, scientific attainments and breadth of view, is making a more powerful, as well as a more dignified, appeal to public interest.

During the life of this Association, besides working out its own special problems, orthopedic surgery has assimilated much that is vital in surgery, medicine and pathology, and this wholesome process is still going on. That period has seen a remarkable development of operative technic, the rise and delimitation of forcible corrective manipulation, the discovery of skiagraphy and its general application in the study of bone affections, and the introduction of methods into pathology and medicine, which promise important advances. The boundaries of our specialty have been much enlarged by able and enthusiastic workers; it is now one of the broadest, and it is still growing. The manipulative dexterity and mechanical equipment of the orthopedic surgeon are frequently drawn upon in the management of old fractures

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which may have resulted in deformity or non-union; and many important recent advances in the study and treatment of fractures have come from orthopedic surgeons. The lack of interest in this subject on the part of many general surgeons is noticeable, and it seems desirable that this class of cases should be recognized as distinctly within our province. In several clinics fresh fractures are referred to the orthopedic department, and this classification is both logical and in line with the best interest of the patient.

Whether general medicine and surgery have assimilated as much of our special knowledge as is necessary for the best results in practice is doubtful, and it is clearly our duty to bring the results of our researches and of our experience before the profession, especially in our local, state and national societies, and in serious medical literature of wide distribution. While the advance of our special work in public confidence is shown by the establishment of new orthopedic wards and hospitals in different parts of the country, and in better provision for orthopedic instruction in medical schools, much remains to be done along these and other lines. Aside from the evident improvement in the quality of the literature and in the methods and results of public and private work, the strongest factor in bringing public and professional recognition has undoubtedly been the activity of this Association.

While the conditions of healthy growth and development so evident in this country have obtained to a considerable extent in Europe, especially in Germany, Austria and Italy, European orthopedic surgery has never been accorded that full recognition which is essential to its proper development. For this reason it is of the greatest importance that our European colleagues should receive our hearty support in action tending to liberate and elevate our branch of work. Largely through the endeavors of one of our active members a sub-section on orthopedic surgery will be organized at the International Medical Congress, meeting at Budapest in September, 1909, if sufficient support is given by orthopedic surgeons, and I bespeak for our corresponding Fellow, Professor Julius Dollinger, of Budapest, Chairman of the Surgical

Section of the Congress, your prompt and hearty coöperation to this end. Steps have also been taken to secure adequate representation for orthopedic surgery at the International Tuberculosis Congress, meeting in Washington next October.

Since our last annual meeting Albert Hoffa, the pioneer and most eminent exponent of the modern revival of orthopedic surgery in Germany, and a corresponding Fellow of this Association, has been removed by death at the height of his power and influence. We are not only indebted to him as a worker, investigator and writer but we retain the pleasantest memories of his stimulating and genial personality. Hoffa's loss may have evil consequences for the specialty in Germany, as it is already reported that the orthopedic clinic in Berlin may be merged in the general surgical service and that similar action may be taken at other important centers. It is hard to overestimate the influence that a dignified and scientific presentation of orthopedic surgery at the Budapest meeting may have on the standing of orthopedics, and I, therefore, feel justified in urging our members to present papers, and in recommending that all active members actually in attendance on that meeting be made official delegates of this Association to the Congress.

The most vivid impression gained from a study of the activities and achievements of strong men like Thomas, Phelps and Hoffa, is perhaps that of the diversity of the conditions under which each knew how to compel success. Work of the highest order has been done under conditions the most diverse, and not seldom the most adverse. Such men create an atmosphere, attract a following, and transform obstacles into opportunities.

While the orthopedic service under the exceptionally strong man may assume various forms and yet be efficient, it is reasonable to inquire what should be the basic features of a modern orthopedic service under ordinary conditions. It is generally recognized that the backbone of a public orthopedic service must be the clinic and hospital (or hospital ward) the former for the ambulant and easily portable cases, the latter for more serious cases requiring operations or other special treatment not easily given in the clinic.

In the last few years owing to the increasing recognition of the beneficial effects of life out of doors, the country or seashore home has become an important part of the orthopedic service. This may take the form of a summer home for tuberculous and other cases needing special invigoration, or of an all-the-year-round home and infirmary for chronic and convalescent cases. While it is undoubtedly beneficial to eliminate such cases so far as possible from the city hospital, it is also advantageous to utilize the home more largely in their care. A very humble home is better in important respects, even for medical purposes, than a very excellent institution. Institutions should be made more home-like and attractive, and the children should be made happy by appropriate employment and entertainment, and by affectionate care, but the home should also be more largely utilized in medical and surgical work.

While the patient is visiting the clinic he is living at home, and when he returns from the hospital or country infirmary, he returns to his home, which thus becomes of fundamental importance to his welfare. In order to obtain the best results it is therefore necessary to study, and, to a certain extent, organize the home, thus making it an integral part of the orthopedic service. The home, properly organized and directed should coöperate with the hospital and clinic, and to a certain extent replace both. The school should also be brought into helpful relation with the home, hospital and clinic, and school activities and hygiene should be regulated for the patient's benefit. Many children unable to attend public schools may advantageously attend special schools or classes for crippled children, or special classes in the hospital, or may receive instruction at their homes. In order that this coördination may be successfully accomplished, a home visiting service of physician and nurse should be organized. This has been done in the following manner in the orthopedic service of one New York Hospital with the happiest results. When a case is discharged from the hospital or summer home, or when a case in the clinic needs special care in the way of dressing or improvement of nutrition, the visiting nurse inspects the rooms occupied by the family and makes a hygienic and socialogical

study of the conditions. Hygienic and economic distress having a direct bearing on the progress of the case is usually discovered, and so far as possible conditions as to air, food, heat, care and comfort are improved. In tuberculous cases the airiest room is selected for occupation by the patient, the windows are kept open and a formal fresh-air cure is instituted and maintained, not only in the room but, in such cases as can be moved, on roofs, an fire escapes, and in yards and parks. The patient is kept in touch with the clinic and hospital, and, if well enough, is sent to a cripples' school and later to the public school.

Having pointed out in a general way the interdependence of the orthopedic work of the clinic, hospital, country infirmary, home and school, and the importance of their coördination and coöperation through a home visiting service, it may be useful to mention a few details in connection with certain phases of the work.

The activities of the work-shop and exercise room, and of the pathological and skiagraphic laboratories are so closely connected with both hospital and clinic that all may be most conveniently housed under one roof, or at least in close proximity. The plant should combine convenience of access with ample grounds for recreation and employment out of doors, and for the accommodation of bungalows, shacks and tents. Where this is impossible, as in some of the larger cities, the hospital work should be divided into a hospital of moderate size in close connection with the clinic for new and acute cases and for active surgery, and a larger country infirmary with ample space, detached pavilions, cottages or shacks, and a resident staff, for chronic and convalescent cases. In this case the city hospital would utilize porches, balconies and roof for its fresh-air work, which is extremely important even in acute cases. The importance of medical and pathological co-operation is gaining increasing recognition, and a continuous service of the attending surgeon is particularly important.

The question of communicable disease is always a serious one in a children's hospital; not only the usual infections, but also trachoma, ringworm, vaginitis and parasites must be detected and provided for. The case of the cripple with pulmonary involvement

is particularly hard: he is regularly rejected by sanatoria for consumptives on account of his bone disease and by orthopedic hospitals on account of his consumption. Provision for such cases should be made in connection with the country infirmary.

The collection of pathological material for permanent exhibition in connection with medical schools and orthopedic hospitals is much neglected. Specimens should be conscientiously preserved, catalogued and exhibited with outline histories and pathologic reports attached. The writer and a friend recently examined the bone collection of one of the leading medical schools of the country. The collection was under lock and key in a remote part of the building and our desire to inspect it was received with frank annoyance by the curator, a well-known pathologist. After the latter had expressed the opinion that a bone collection was simply a nuisance, we were admitted to the dimly lighted room and were left to find our way among the specimens, whose dusty covering showed that they had rarely been disturbed. Many of the specimens were of the greatest interest but they were practically without historical data, and we noted that the collection had not been added to in a generation. We should not allow the microscope and culture tube to displace pathological anatomy, which surely has much to teach us.

A uniform classification and system of records for orthopedic cases are greatly to be desired in hospital and clinic work. It would seem that agreement among orthopedic hospitals on these matters should be possible.

Annual reports should be raised from the low plane of solicitation of funds and enriched from time to time with helpful administrative data and scientific studies of some of the material handled.

Such are, in briefest terms, a few of the lines along which orthopedic work may be made both more interesting and more valuable. The main contention is that modern orthopedic surgery requires careful study of, and adaptation to, the daily life of the actual or potential cripple.

II.

ALBERT HOFFA.*

BY ROBERT B. OSGOOD, M. D., BOSTON.

On the evening of December 31, 1907, almost at the beginning of the new year, at the age of forty-eight, Albe t Hoffa died—Geheim-Medizinalrath, Professor in the University of Berlin, devoted son, loving father, loyal friend, benefactor to Orthopedic Surgery.

A few severe attacks of angina pectoris and a myocarditis which followed a long existing diabetes, were the immediate causes of a death which has left a gap in the ranks of the medical profession almost impossible to fill, a loss which is mourned by those who knew him as a great personal bereavement.

In spite of warnings which his heart's action gave him, he could not be dissuaded from undertaking a journey to Antwerp at the call of a former patient who needed an operation. His strength was overtaxed, and, forced to forego the object of his trip, he turned back. He grew rapidly worse on the homeward journery and was taken from the train to the Augusta Hospital in Cologne, where the end came after a short illness.

Hoffa was born in Richmond, Cape of Good Hope, South Africa, on March 31, 1859. He was the son of a German physician of Kassel, the late Dr. Moritz Hoffa, who had removed to South Africa at the time when the great industries of that region were beginning to develop. In 1868, when a boy, Hoffa the son came to Germany to be educated. After graduation from the Friedrichs Gymnasium at Kassel, he began his medical studies at Frieberg.

His personal popularity was evidenced by his membership in one of the most fashionable of the students' corps, but his devotion to his studies was so unsatisfactory that at the end of his

*Read before the American Orthopedic Association at its Twenty-second Annual Meeting, held at Chicago, June 4–6, 1908.

second year he received a most severe reprimand from his father. It is said that this marked the turning point in Hoffa's life. It is certainly a fact that from this time on he became entirely absorbed in his work, and in 1883, at the age of twenty-four, received his medical degree, passing both his tentamen physicum and state examination with highest honors.

He entered upon his professional career in the Julius Hospital in Würzburg, Bavaria. His attention was directed to surgery and he became the favorite pupil of Maas, that master of surgical teaching, and later the assistant on Schönborn.

In 1886 he was married and began independent practice, busying himself at first with pathological anatomy and bacteriology. He soon was appointed Privatdozent, and focusing his attention on what was to become his life work, he established a private sanatorium in Würzburg for the practice of orthopedic surgery, medical gymnastics and massage. This was the first of its kind in Germany.

In 1893 Hoffa paid his first tribute to American Orthopedics by coming to America in order to study our methods of treating joint tuberculosis. He was made extraordinary professor in the University of Würzburg in 1896, and having served his time in the army was in 1897 given the rank of Oberstabarzt in the Royal Bavarian Corps of Hygiene.

His clinic at Würzburg grew rapidly and soon became almost international. Hoffa at this time was immensely productive. His Lehrbuch der Orthopädischen Chirurgie, which has run through five editions and is still standard, was followed by valuable textbooks on fractures and dislocations, bandaging and massage, and a volume entitled, "Die Orthopädie, im Dienste der Nervenheilkunde." His Atlas of Orthopædic Surgery, illustrated with Rœntgen pictures, was produced in 1906 in collaboration with Rauenbusch. The training which Hoffa had had fitted him most thoroughly to write with authority. His large surgical experience enabled him to apply its exact principles to orthopedic requirements. Studies at the old institution at Wiesbaden and personal training in the technic of massage under Mosengeil at Bonn made him a master of this valuable adjunct to orthopædic treatment. There

was scarcely a phase of orthopedic life in Germany which did not feel Hoffa's influence. He was president of both the Deutsche Orthopædische Gesellschaft, which he founded, and the Rœntgen Gesellschaft. It was Hoffa who founded the Zeitschrift für Orthopädische Chirurgie and who has been its editor-in-chief since 1892. It was Hoffa who in recent years has been the leading spirit in the collaboration of a complete catalogue of the orthopædic literature of the world, and in the establishment of the Zentralblatt für Chirurgische and Mechanische Orthopädie. His monographs are many and valuable. His contributions to the treatment of congenital dislocations of the hip led to very careful studies of this important condition. Wide experience with the method of reduction by open operation convinced him finally of the greater advantages of the bloodless method in spite of his highly developed operative technic.

While there existed in Germany before Hoffa's day an orthopædic specialty, it lacked the exact surgical methods which he entirely mastered and developed. His clinic was rich not alone in operative material, but there came to it also many cases requiring corrective gymnastics and apparatus. He did not hesitate to adopt valuable methods of treating these conditions from outside the medical profession and soon rivaled Hessing as a designer of nice mechanical appliances, and of course far surpassed him in the judgment with which the apparatus was applied. It has been my humiliating experience to fail in devising a comfortable and effective apparatus for a difficult ununited fracture in an out-patient case. A few months later this man returned to the clinic in triumph, wearing a simple, thoroughly efficient, beautifully made splint, for which he had journeyed to Berlin, and which he said had been devised by Professor Hoffa in his clinic.

The great desire of Hoffa's life was fulfilled, when after the death of Julius Wolff, he was called in 1902 to the head of the University Polyclinic in Berlin. His activities here broadened astonishingly, and with daily visits in three clinics his duties became very exacting. He devoted himself to many social problems. He was a generous supporter of societies for the care of children

and of cripples and for the prevention of tuberculosis. The Cecilienheim in Hohenlychen dedicated to children suffering from bone and joint tuberculosis is a permanent memorial to Hoffa's philanthropic energy. The Humboldt Sanatorium in the Canary Islands was made possible largely through Hoffa's interest, as was also the Kindererholungsheim in Gross Lichterfelde. As professor in the University, Geheim Medizinalrath, head of a clinic in which all assistant places were eagerly sought, and under the influence of an enormous and very lucrative private practice, and the brilliant life of the capitol, personal productivity ceased. The great productivity of his clinic, however, drew its inspiration from him.

Decorations had been conferred upon him by the German emperor, the Czar of Russia, the Sultan of Turkey, the Shah of Persia, and the Khedive of Egypt. In 1904 Hoffa came to America to receive the honorary degree of LL. D. from Jefferson, and took part in the Atlantic City meeting of the American Orthopedic Association.

Great accomplishment requires not only the individual labor of a single man but the power to attract and to direct the endeavors of other men. This power belonged to Hoffa in an unusual degree and its influence has been widely felt.

In 1904 a young German medical man came to this country to accept a position of some responsibility in one of the Eastern hospitals. By wide reading, by diligent study of museum specimens, and by close observation of an ample clinic, an important and original theory as to the etiology of certain cases of scoliosis was developed. America had given him his opportunity and America was ready to be his foster mother. A word from Albert Hoffa and he hastened to Germany; another word and his American opportunity was abandoned. A greater financial recompense a more unique position, a future which seemed certainly bright were to his mind of little value when compared with an opportunity to work as an assistant to this compelling man. Other men have adopted similar courses, and here we find one of the striking evidences of the greatness of Hoffa.

This power to attract men lay not only in his scientific attain-

ments and in his executive force in directing the labor of others, but in his wonderful personality.* "Hoffa's humane qualities were perhaps quite as remarkable as his professional accomplishments. He was a tremendous optimist, always bringing humor and sunshine with him. His co-workers looked upon him as more than a father and as an all-giving friend. His colleagues found him scientifically accurate but also politely receptive. The force of his simple friendly demonstrations lay in the skillful grouping together of all the facts bearing upon the case, so that they appeared in the clearest and most significant light. His patients imposed in him complete trust." This happy generous nature seems to have impressed all with whom he came in contact. I never met him but once, but I shall always remember the friendliness of his hand on my shoulder as said he good-night.

In a letter which is full of respect for his dead chief, but which overflows with affection for Hoffa the great-hearted man, Wollenberg, his first assistant, says, "He was especially devoted to out-of-door life, which refreshed him in spite of all exertion. How happy he was when he could go out into the woods, when the great city with its troubles lay behind him, and how rested he would return to work. And then he would tell his experiences in the most humerous manner. He was the friend of a good joke, and when he had heard a new and fine one he used to gather his assistants around him and enjoy the effect of his own recital of it. How often would he then join in the merry laughter!"

"Whoever would have known Hoffa intimately, must have seen him in his family. One can scarcely imagine a more tender and affectionate father than he, and it was a pleasure to see how much support and refreshment this rare man found in his family. He was not only a loving husband and father, but also a devoted son. Hoffa was especially affectionate to his old mother, and it was a joy to see mother and son together. It always pleased Hoffa extremely to hear his mother say that his father was a much abler man than he."

As Schanz, speaking for Hoffa's former assistants at the funeral services, said, "Liebe hat uns mit unserem Lehrer verbunden, und

*Extracts from letters, etc.

dieses Band war vor allen das festeste." (Love had bound us to our teacher, and this bond was the strongest of all.)

Hoffa's accomplishments are the property of the profession. Hoffa's admirable personality will live after him and make the lives of other men more kindly. The stimulus of Hoffa's energy and singleness of purpose will continue to advance the specialty to which he gave the best years of his life and in wich he attained a just and enduring eminence.

III.

A NEW TREATMENT FOR OLD TUBERCULAR SINUSES.*

BY DRS. JOHN RIDLON AND WALLACE BLANCHARD, CHICAGO.

Every orthopedic surgeon is familiar with the old sinuses of tubercular joint disease which have persistently resisted all treatments and continued for months and even years. The discharge is a constant drain upon the vitality of the patient. The pus frequently seeks new directions and new outlets until often an old case of Pott's disease or of tubercular hip disease may have three or four discharging and twice as many closed or partly closed sinuses. These cases in a large orthopedic hospital represent alike the neglected patients and the delayed cures or failures of operative, mechanical and other treatments. Especially trying are the abscess cavities and the sinuses which frequently follow excision of the head of the femur. These sinus cases with their daily dressings are a constant source of trial to the staff surgeons and nurses.

January 15, 1908, Dr. Emil G. Beck, of Chicago, reported that while using a bismuth-vaselin paste injection in an old sinus for the purpose of obtaining a clearly outlined skiagram of the track it pursued, he accidentally discovered that the bismuth-vaselin paste was a cure.

On February 3, at the Home for Destitute Crippled Children, we began treating 26 of our old tubercular sinus cases with the bismuth-vaselin paste, reserving a number of similar cases for comparison. The formulæ for these injections, which we will designate as No. 1 and No. 2, are as follows:

FORMULA NO. 1, FOR DIAGNOSIS:

℞ Bismuth subnitrate, 1 part
Vaselin, 2 parts
Mix while boiling.

*Read before the American Orthopedic Association at its Twenty-second Annual Meeting, held at Chicago, June 4–6, 1908.

FORMULA NO. 2, FOR TREATMENT:

℞	Bismuth subnitrate,	6 parts
	White wax,	1 part
	Soft paraffin,	1 part
	Vaselin,	12 parts

Mix while boiling.

In most of the cases the first formula, that is, for diagnosis, was used and a skiagram was then taken showing the ramifications of the sinuses. With few exceptions formula No. 1 was evacuated within 24 hours. Formula No. 2 was then injected into the fistulous opening until it would hold no more without painful distention. This injection was usually retained in full or in part.

The injections are made with the bismuth paste at a temperature sufficiently above blood heat to give the paste the consistency of cream. The second formula cools sufficiently in three minutes after injection to produce the consistency of cottage cheese. Cone-point glass syringes are used, of sizes varying from one to eight ounces, with the nozzle placed with gentle pressure in the orifice of the fistula.

Every two or three days the fistulas were reinjected with an amount of paste approximately equal to that discharged into the dressings. If none had escaped, no reinjection was made.

Our cases under this treatment varied in several respects from those reported by Dr. Beck. Our experience has led us to divide the cases into three classes—the favorable, the partly favorable and the negative cases.

In favorable cases the injection of the bismuth paste into a fistula, or one of several communicating fistulas, forced out the pus, the bismuth replacing the pus. On the second or third day the pus discharge was changed to a transparent serous fluid, which gradually decreased and the fistula dried up. The opening of the fistula healed over in from one to three weeks, and the fistula was cured with the bismuth partially retained.

The partly favorable cases were those in which there had been extensive bone destruction, leaving many ramifying sinuses. The injection of the bismuth paste three times a week, in large quantities, into one or two of the sinuses forced the pus out of the

other connecting sinuses. In two or three weeks the pus was changed to a transparent viscid fluid, giving assurance that after months of persistent treatment the sinuses may be cured.

FIG. 1.—Skiagram of tubercular spondylitis with psoas abscess, Case 7 of Table 2, after injection of formula No. 1 of the bismuth paste at the open sinus opposite to the second lumbar vertebræ. It shows extensive sinus ramifications with a pus sac in front of the sacrum and a capacious fistulous tract extending from a level with the second lumbar vertebra down into the thigh.

The negative cases were those in which there had been extensive bone destruction, with retained sequestra and ramifying pockets

that were so deeply and peculiarly situated that the bismuth paste could not be forced into them so as to displace the pus. In one case the pus became compressed in an unsuspected pocket, and a painful inflammation was produced at that point. The patient developed a temperature and became quite ill. The pus pocket was soon evacuated and the case is now on our improved list.

Dr. Beck advances two theories concerning the action of the bismuth-vaselin paste in effecting a cure. One is that the bis-

FIG. 2.—Skiagram of tubercular hip disease, Case 3 of Table 2, after injection of formula No. 1 of the bismuth paste at the open sinus upon the inside of the thigh. It shows four pus sacs, all having sinus connections with the hip-joint.

muth acts as a destroyer of disease germs and as a frame-work for the formation of healthy granulations. The other is that when the skiagram is taken immediately after the injection of formula No. 1, the bismuth by exposure to the X-rays becomes radio-active, which promotes the formation of granulations.

Our observations lead us to believe that there is but one tenable theory and that is that the hard and firm bismuth plug acts only in a mechanical way. First, the bismuth-vaselin and wax plug

forces and squeezes out the pus. Second, it so completely fills the sinus as to prevent the ingress of air-carried germs. Third, it compresses the unhealthy granulating surfaces, and a normal healing process naturally results.

Of the 17 cases of tubercular sinuses at first treated with bismuth-vaselin paste injections, 9 were cured in from 7 to 33 days, while 7 of the remaining 8 were more or less improved at the end of three months. While these remarkable results are far beyond our most sanguine expectations, still they also fall far short of showing the full limits of the usefulness of the bismuth treatment.

Heretofore all attempts to open psosas, hip and other tubercular abscesses without incurring secondary infections, temperature and sickness have failed. We have opened two psoas abscesses which discharged nearly a quart of pus each and injected eight ounces of the No. 2 formula of the bismuth paste into the abscess cavities.

We also opened two tubercular hip abscesses which discharged nearly a pint of pus each and injected four ounces of the bismuth paste into the abscess cavities. In each case we injected as much as the cavity would hold.

The openings were dressed only with sterilized gauze and cotton. In each case the abscess closed in about nine days, but opened three or four days later and discharged about one-fourth of the injected bismuth paste. This was followed by a discharge of transparent serum which diminished after three or four days to ten or fifteen drops a day. This serous discharge remained absolutely sterile and after a few days ceased altogether.

There was no rise in temperature or other untoward symptom in either case and we believe that the problem of opening tubercular abscess and keeping the cavity sterile has been solved.

A tubercular abscess should be punctured with a narrow bistoury and the incision should be as small as that usually made for a tenotomy. The pus will escape sufficiently in three to five minutes for the injection of the bismuth paste. The quantity of paste injected is limited only by the amount the abscess cavity will hold. The small size of the puncture prevents the immediate escape of any of the bismuth paste, which now becomes a most effective plug against the admission of outside infection.

This method of treating abscesses opens a new era in the treatment of tubercular joint disease. It is not, perhaps, too much to say that this t eatment will shorten the duration of many cases of tubercular joint disease by two-thirds or even nine-tenths, and make a great reduction in the mortality from prolonged suppuration.

Before commencing the bismuth-paste treatment, 6 of the cases herein reported were under the tuberculin treatment by the Wright method for one and one quarter years, with no noticeable change in either the quality or the quantity of the pus discharged from the several sinuses. Two of these six sinus cases have since been cured, and the other four so much improved under the bismuth-paste treatment as to give promise of ultimate cure.

TABLE No. 1 OF TUBERCULAR SINUSES CURED UNDER THE BISMUTH-PASTE TREATMENT.

NO.	NAME	AGE	DISEASE	DURATION OF DISEASE	NO. OF SINUSES	NO. OF TREATMENTS	RESULTS
1	Tom S.....	13	Hip dis.....	8 yrs.	2	15	Cured in one month.
2	Jake T.....	5	Hip dis.....	2 yrs.	1	7	Cured in one & one-half mos.
3	Eddie H.....	7	Pott's and hip dis.	2 yrs.	1	1	Cured in seven days.
4	John B.....	9	Hip dis.....	4 yrs.	3	11	Cured in thirty-three days.
5	Rob't. E. L.....	11	Hip dis.....	1 yr.	1	4	Cured in twenty-one days.
6	Walter P.....	7	Pott's.....	4 yrs.	2	7	Cured in eighteen days.
7	Jas. P.....	5	T. B. finger.....	2 yrs.	2	2	Cured in ten days.
8	Loretta H.	8	Hip dis.....	4 yrs.	2	13	Cured in one month.
9	Dorothy T.....	12	Pott's.....	5 yrs.	1	1	Cured in seven days.

Two of the above cases were cured and discharged too quickly to get their comparative weights. They were Case 3, Eddie H., who was cured with one treatment in seven days, and Case 5, Rob't R. L., who was cured with four treatments in twenty-one days. The other cured cases have shown a gain in weight in the

past three months, as follows: Case 1, 5 lbs; Case 2, 1½ lbs.; Case 4, 6¾ lbs.; Case 6, 4¾ lbs.; Case 7, 1 lb.; Case 8, 2 lbs.; Case 9, 1 lb.

TABLE No. 2 OF CASES STILL UNDER BISMUTH-PASTE TREATMENT.

NO.	NAME	AGE	DISEASE	DURATION OF DISEASE	NO. OF SINUSES	NO. OF TREATMENTS	DURATION OF TREATMENTS	PRESENT CONDITION
1	Chas. T.....	9	Hip dis..	3 yrs	1	20	3 mos.	Unchanged.
2	John K.....	12	Hip dis..	9 yrs.	3	13	3 mos.	Improved.
3	William B.....	6	Hip dis..	2½ yrs.	2	22	3 mos.	Improved.
4	Martin S.....	12	Hip dis..	6 yrs.	1	6	1 mo..	Improved.
5	Fannie L.....	15	Pott's ...	6 yrs.	6	28	3 mos.	Improved.
6	Annie McN.....	7	Pott's ...	2 yrs.	3	10	1 mo..	Improved.
7	Sam C.....	11	Pott's ...	6 yrs.	3	27	3 mos.	Improved.
8	Henry R.....	11	Pott's ...	8 yrs.	3	11	1 mo..	Improved.
9	Vincennes D....	7	Hip dis. excised head...	..	4	2	1 week	Result awaited
10	Denny C.....	8	Hip dis. excised head...	..	3	2	1 week	Result awaited
11	Benj. B.....	8	T. B. knee	2 yrs.	2	1	1 week	Result awaited
12	Eliz. B.....	11	Hip dis. excised head...	..	4	2	1 week	Result awaited
13	Louis R.....	11	Hip dis..	3 yrs.	1	4	1 week	Result awaited

TABLE No. 3 OF TUBERCULAR ABSCESSES OPENED AND INJECTED ONLY ONCE WITH BISMUTH PASTE.

NO.	NAME	AGE	DISEASE	DURATION OF DISEASE	ABCESS	RESULTS
1	Elmer H.....	5	Pott's.....	3½ yrs.	Psoas	Cured in twenty-one days.
2	John S.....	17	Pott's.....	5 yrs.	Psoas	Cured in twenty days.
3	Sam J.....	7	Hip dis.....	2 yrs.	Thigh	Cured in twenty-eight days.
4	Josephine O....	5	Hip dis.....	2 yrs	Thigh	Cured in eighteen days.

In neither of the four cases of abscess of the last table that were opened and injected with bismuth paste two and three months ago was there any rise in temperature or other unfavorable symptoms.

These surprisingly successful results certainly indicate the opening of a new era in the treatment of tubercular abscess.

In several of the old sinus cases the sinuses closed up after 7 to 14 days of treatment and opened up again with a discharge of bismuth paste and a serous fluid for a few days, and then closed permanently. This expulsion of bismuth paste was due to the healing in and contraction of the pus sacs and sinuses. The only case of the 26 reported that is not either in the list of cured or improved is shown by the skiagram to have a large retained sequestrum and cannot be expected to improve until that is removed.

Of course it is understood that the closing of the sinuses does not imply any relaxation of the mechanical and other treatments in case of progressing tubercular joint disease.

We feel that Dr. Beck has brought us one of the greatest advances in the history of the treatment of tubercular joints, and its value can hardly be overestimated.

The unparalleled results obtained during the last three months in the 26 cases here reported lead us to believe that this method of treatment will be generally adopted.

IV.

THE INFLUENCE OF WEIGHT-BEARING ON THE TREATMENT OF TUBERCULOUS HIP-JOINT DISEASE.*

BY V. P. GIBNEY, M. D., L. L. D., NEW YORK CITY.

One day during the epidemic of the bloodless reduction of congenital dislocation of the hip a case of hip disease in the early stage was brought from New Haven into my office for the advice of the gentleman who was the prime mover in this treatment, and the history given was a typical one in a young child of four years. I sat as a spectator while the professor made an examination and heard him pronounce the case one of hip disease, first stage. He ordered a short plaster-of-Paris spica bandage and suggested that the local physician conduct the treatment, giving a good prognosis if the spica should be employed. I made no comment as my advice was unsought, but I did a tremendous lot of thinking, and to myself made a very different prognosis. I did not make a note of the name of the patient or of the name of the local doctor, something quite contrary to a custom which had long since grown into a confirmed habit. I did say to myself, however, that the case would "turn up" again after the consultant had left the country and that in all probability I would be called upon to apply a traction splint, and have the opportunity of demonstrating to the father the superiority of the American method. I thought too how strange it was that an orthopedic surgeon of such experience should so confidently turn the case over to one presumptively lacking in a knowledge of the details of the management of so dread a disease as hip disease. And yet, to this day, I have never seen that case again nor have I heard a word concerning its final result. Other thoughts at this time were coming to the front. My mind reverted to the 13 years of expectant treatment when I was assistant to the late Dr. James Knight in

*Read before the American Orthopedic Association at its Twenty-second Annual Meeting, held at Chicago, June 4–6, 1908.

the Hospital for Ruptured and Crippled, 1871 to 1884. It was not difficult to recall the many tramps about the City in search of end results, and the data on which many tables and statistics were compiled during those valuable years. Cases came before me in this review wherein the diagnosis had been unquestioned and unquestionable and wherein no protection had been given the joints, no traction apparatus, no traction in bed, and where years subsequent to the early examination in the hospital a good result had obtained. True, the number had not been great, and the conclusion then reached was that the lesion had been small and isolated and the resisting power had been satisfactory.

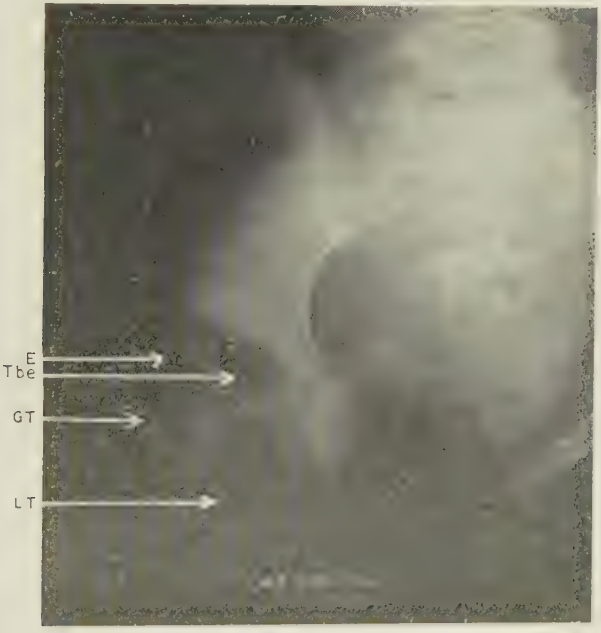
Since that day when the New Haven child was sent home to get a plaster-of-Paris spica, my mind has been very active. A further study of results has led me to review the factors concerned in the treatment of tuberculous bones involving joints in the light of a varied experience. During the "seventies" my daily handling of the material so liberally supplied by the Hospital for the Ruptured and Crippled, both in the In-door and the Out-door Departments (for both departments were under the control of the resident staff and we had no out-patient clinical staff in those days), made me exasperatingly familiar with the expectant treatment. Steel braces of many types were employed for spinal disease and deformities, for club-foot, and for the protection of joints in infantile paralysis, but protection of joints invaded by active and progressive disease was regarded as unscientific and really harmful. Blisters and poultices and liniments and muslin bandages and alterative tonics and bed treatment during exacerbations were the agents employed year in and year out. The only way that we could keep up our interest in the 13 years of such dreary, monotonous work was to make a study of end results and the natural history of "scrofulous" diseases of the bones and joints. Publication of statistics and groups of interesting cases led to a certain skill in differential diagnosis, and an occasional autopsy by that able pathologist, Dr. Edward G. Janeway, gave me an insight into the changes wrought by disease in joint structures unembarrassed during life by traction splint, weight and pulley, or immobilizing apparatus.

Without referring to the papers already published giving the deformities, the disability and the deaths that were so faithfully tabulated, I must ask you to believe that I am well acquainted with the results of expectant treatment, sufficiently well informed to institute comparisons. From 1884 to the present time I have had a large experience with the ambulatory traction hip splint in all of its modifications except those which allow motion at the joint. Immobilization has always appealed to me, and yet the tendency has been to continue this too long, notwithstanding the warning given by the general surgeon. Traction in bed in line of deformity, both for the correction of the same and for the relief of pain in exacerbations, has been at times a favorite method both in private and in hospital practice. Results have been in some cases satisfactory, and rarely have I been able to secure perfect restoration. Reference could be made to publications by members of this Association of statistics showing end results in cases treated from first to last by what is known as the American method. The late Hugh Owen Thomas, as you well know, claimed the best results from immobilization with and without the use of the limb, that is, crutches and high shoe in the more active stages of the disease and without these aids in the less active. Suffice it to say that the profession in general still believes, and standa d works on surgery assert, that cures without deformity and complete restoration of function are not to be had, and orthopedic surgeons claim that cases if taken early are sometimes brought to a perfect cure. With this condition of things existing, it does seem that there is something to be desired in the therapeutics of lesions now under discussion. Pathologically considered, it would seem that the weight of the body should never be considered as safe until one is assured that all active disease, all exacerbations, have passed. When one finds at operation, on the autopsy table, and on studying the adiogram, the head and neck pretty well honeycombed by tuberculous lesions, one feels that the articular surface and the cartilage of incrustation must at all hazards be protected, and yet during the last few years my clinical experience has led me to believe that the danger is a fancied one and not real. It has seemed to me that if the motion of a joint thus affected be put out

of commission, the weight of the body in walking may be useful rather than harmful, and I beg to submit a few cases in corroboration of the view thus expressed. End results are not numerous enough for statistical demonstration, but the subject can best be discussed by a body I have the honor of addressing. Good may ensue from such a discussion.

Case I.—*Hip disease; rather acute invasion; extensive changes in head and neck; deformity; traction at first; fixation with use of limb the greater period of treatment; result nearly perfect.* A girl, 20 months of age, was referred to me November 28, 1900, by Dr. Payne, of Norfolk, Virginia, with the following history: She was quite well and free from lameness up to the evening of the 18th. That night she cried out "every minute," and next morning was unable to walk, holding the left hip in flexion as she stood. A diligent search was made for anything in the nature of a trauma that would account for the signs and symptoms. She did not rest well the night of the 19th, but walked a little on the 20th and 21st, "dragging the limb." On the 22nd Dr. Payne examined her and found the hip pretty well fixed in flexion at an angle of 120°. There was resistance to motion in every direction with reflex spasm, and since that date, the deformity has increased. My examination included a search for signs pointing toward any infection in other joints. The left hip was held in firm flexion at an angle of 135°, no swelling, no bony enlargement, no joint tenderness, nothing in the iliac fossa, nothing found in the spinal column. There was no atrophy of thigh or calf, no shortening. The diagnosis of hip disease starting with an unusually acute exacerbation was made, and treatment with the traction hip splint was started at once. No radiographic observations were made, and on the 13th of December the child returned home fitted up comfortably with a traction splint. The course of the disease from this date to the 16th of May when she was brought back for further observation is interesting especially in the light of the subsequent course and the revelation of the radiogram No. 1. Quotations from Dr. Payne's letters will best illustrate. The first under date of February 11, 1901: "About Christmas time she had an attack characterized by high fever and increased rigidity of the hip joint" . . . "Salicylate of soda and improved magically" . . . "She fattened and grew rosy until within the past week she is again running temperature ranging from 102°, A. M., to 105°, P. M., by rectum" . . . "Hip joint is absolutely fixed." Under date of May 14th: "In February she had an attack of fever." (See ex-

tracts from letter of February 11th.) "I thought this was due to the hip but subsequently found it due to malaria. About 3 weeks ago she again had an attack without fever, suffered much pain and considerable swelling of the hip. This immediately followed . . . handling of the parts. It subsided in about ten days." Note please these three exacerbations occurring while the joint was supposed to be well-protected by a traction apparatus. On May 16th, I had an opportunity of examining her and found the angle of extension 170°. The splint was re-adjusted and put in repair, no short-



CASE 1.—Showing head and neck partially destroyed, and yet with motion preserved.

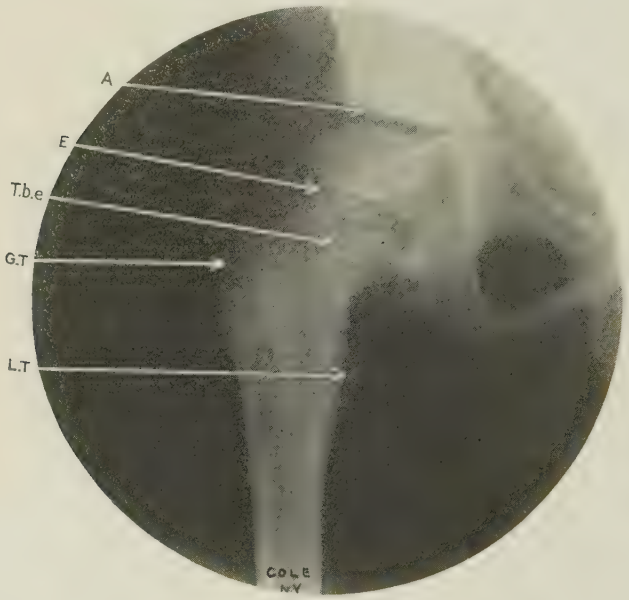
ening. Notes made in October of that year and in April, 1902, showed continued improvement with gradual increase of motion from 180° to 90°. There was no change except for the better from this time to the 17th of April, 1903, except a gradual improvement with no more exacerbations, when the first radiogram was taken showing the neck of the bone nearly destroyed with an irregular worm eaten head and the acetabulum involved. Now a short plaster-of Paris spica bandage was substituted for the hip splint. The shortening had developed by this time to ¾ inch with

range of motion pretty well preserved. On May 8th a letter was received from the father: "We are all surprised and delighted at the way she gets along with the plaster cast. She gets about just as well as she did with the brace." From this date to the present time the child has been brought to New York for a radiogram and the renewal of the plaster spica every six months. The child was very active, using the immobilized limb about as well as she did the other. She would outgrow the plaster-of-Paris spica frequently before the dates for changing came around, and apprehension was on those occasions excited. Yet a remedy was always at hand, and the father, as well as myself, became intensely interested in these half-yearly radiograms. We could discuss from time to time reparative processes, and the plates, I am sure, always suggested the wisdom of the plan adopted, viz.; to permit the weight of the body in walking and running, but permitting no motion at the joint. I was at a loss, however, in September, 1904, 18 months after the plaster had staken the place of the hip splint to explain a limitation of the range of motion and a moderate degree of flexion deformity until some 18 months later when an opportunity offered to see her at her own home in Norfolk playing with her fellows. If ever a privilege was abused, hers was. She did more than walk and run. She was a veritable tom-boy, and the plaster was broken in the most important places. However, the flexion deformity above mentioned was promptly corrected under an anesthetic, the plaster was immediately re-applied, and she was walking within 48 hours, going home a few days later. This case has been reported in probably tedious detail, but it has been so instructive to the writer of this paper that he deemed it necessary. And just a word more for the end result. The treatment was continued without interruption to November 12, 1906, when the spica was omitted, and active movements supplemented by careful massage were begun. At this time there was $\frac{3}{4}$-inch shortening, the limb was extensible to 180°, very little motion in flexion allowed, but 2 days later, she could voluntarily flex to 90°, could abduct over one-half the normal arc, could adduct over one-fourth, and it was deemed safe to send her home convalescent. The last note I have is on November 21, 1907, and I quote from my notes verbatim: "Hip can be flexed easily past 90°, abduction better than one-half, adduction nearly normal, extends to 180°, puts on her own shoes and stockings, as she walks dips a little to the side but column deflected very little, if any. There is no rotation, with knees straight she can bend over and touch the floor with her fingers, general health good. R. A. $25\frac{3}{4}$. L. A. $25\frac{3}{4}$. R. U. 29. L. U. $28\frac{3}{4}$. Right thigh, 7 inches

down, $13\frac{1}{4}$. left, 12. Right knee, $10\frac{1}{4}$, left, 10. Right and left calf, 10 inches.

CASE II.—*Lesion starting in femoral neck; invading head later; plaster-of-Paris spica throughout; abscess; aspiration; relief; no deformity; no shortening.* A boy, 6 years of age, came under my care through the courtesy of Dr. William B. Anderton on November 19, 1906, the diagnosis we made being tuberculous ostitis of the right hip (hip disease). From this early infantile period he had been a victim of winter attacks of bronchitis, and one two years prior to the date above mentioned was so severe that it was regarded as pneumonia. A paternal uncle had died of pulmonary tuberculosis. Early in October, without a history of any trauma, he complained of pain around the patella, soon thereafter had night cries, and a limp accompanied these symptoms. There had been no remission. Our examination of the 19th revealed the following: Marked hip limp, extension not permitted beyond 165° and flexion not beyond 90°, abduction and adduction limited to small ranges, both internal and external rotation limited, in fact reflex spasm in every direction. The lips were large and of the type formally designated as "scrofulous." The case was investigated quite thoroughly for any infection other than the bacillus of tuberculosis with negative results. A radiogram was secured promptly and two days later a short plaster-of-Paris spica was applied, the radiogram showing obscuring of the epiphyseal line, especially at the inner end. My faith in the efficacy of immobilization alone was not complete and I determined to employ a perineal crutch as supplemented by moderate traction. He derived so much relief from the spica that we had some difficulty in getting him to use the hip splint which was made to fit very well over the plaster and was supplemented by axillary crutches, so that by the 6th of February, 1907, the splint was discontinued. No traction had been employed because of the comfort obtained from the immobilization. On this date also the spica was removed because he had outgrown the one applied in November. Note was made and recorded that the hip functions with the exception of flexion were about perfect and even flexion could reach 90° easily. The use of the limb in walking was permitted with more liberties, and on the 2nd of April the plaster-of-Paris was removed for observation and consultation with the family physician. The functions of the hip were so nearly perfect that we decided to omit the spica for a week or two and note results. On the 5th the limp was pronounced and he tired easily although he had no pain at night and was in good physical condition. Inward rotation and hyperextension were found limited a little and flexion be-

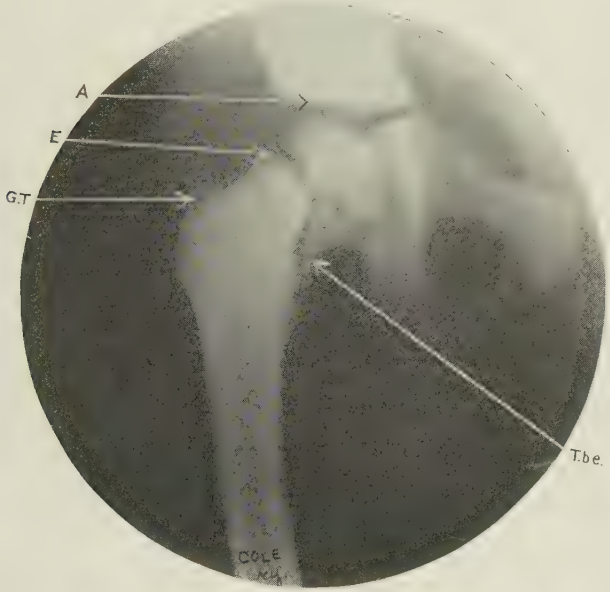
yond 90° was still resisted and evoked reflex spasm. Up to this date an ordinary muslin roller bandage was worn as a spica. Thinking that perhaps this was an obstacle to free motion all local applications were discarded and a warm bath at night was the only treatment employed. A close observation convinced us by the 12th of April that the range of motion in all directions was decreasing and that the lameness was more marked, so on this date the plaster-of-Paris spica was renewed. From this time his confidence was restored and relief was prompt. On May 26th



CASE II.—Showing a beginning lesion at junction of Epiphysis and Diaphysis.

the plaster was changed and advantage was taken to get another radiogram, which showed this suspicious area at the inner end of the epiphyseal line, no longer suspicious, but there was a triangular area on the femoral side of the line, white, and an unmistakable lesion. Radiogram. No. 2. The measurements were equal as to length, extension to 180°, flexion to 100°, other movements while not perfect were satisfactory. The next observation was made October 24, 1907, on his return from the country when the limbs were found equal in length, angle of greatest extension 180°, that of flexion 120°, no pain, no tenderness. A radiogram was taken, showing still more involvement of the neck and head but

contour well-preserved. Dr. Cole, who made the radiogram, reported a typical tuberculous lesion. Radiogram No. 3. The spica was removed and later, say in December, the calf was swelling a little, and on removing the plaster-of-Paris a well-marked fluctuating tumor was found in the lower part of Scarpa's space. An abscess was easily recognized and had developed without any of the prodromal pains and night cries with which we are all so familiar. There was no interference now but when the spica was renewed a fenestrum was made for the tumor. By the 7th of March, the



CASE II.—With lesion farther advanced, motion being still preserved with no changes between shaft and neck.

tension having increased, an aspiration was made with removal of about an ounce of thick, sterile pus, and a month later aspiration again without pus but venous blood. After this the swelling gradually became smaller, and the latter part of May had about disappeared. The patient is in fine condition and goes to the mountains for the summer still wearing the plaster-of-Paris. While it is true that this case is incomplete, it is also true that the disease has passed through all the stages pathologically, and the customary clinical history has not been present, viz.; deformity, pains of a more or less excruciating nature, exacerbation, etc.

Take another pursuing a mild, uneventful course, the lesion in-

volving the upper rim of the acetabulum, and yet how we dread acetabular disease!

CASE III.—*Involvement of upper portion of acetabulum.* A lad, 5 years of age, referred by Dr. Aspinwall Judd, was first seen on July 17, 1907, with a history of mucous colitis at the age of two and suspected of being tuberculous. In June, 1906, then being four years of age, he began to limp, favoring the left hip. The limping was about the only sign for at least ten months and was so slight at times that treatment was not sought. Six weeks prior to my first observation, his limp became more marked and a week's rest in bed brought relief. Dr. Judd had radiogram taken in December and the negatives seemed to show a rarefying process in the femoral neck. This I have not seen. The child was taken to one of my colleagues a week or ten days before coming to me, and hip disease was diagnosed, a hip splint being ordered, was applied, and soon thereafter removed by the family physician. Indeed on the day of my first observation the adhesive plasters for traction were still in place and my examination for that reason was not complete. The doctor had some doubt as to the propriety of dispensing with the traction splint, but I did find the functions very nearly normal, reflex spasm hard to bring out, and a gait free from lameness. The case was sent to Dr. Caldwell for a radiogram, and this is reproduced here showing the shadow in the upper quadrant of the acetabulum. Three days later an examination was more thorough, the adhesive plasters having been removed, and the diagnosis was made in accordance with the radiographic findings. A plaster-of-Paris spica was applied, and within less than a week the child was quite used to the immobilization; and I could offer no objection to his removal to Colorado. On September 19, 1907, the little patient had been brought down for observation. The general health had been excellent all summer, and no signs or symptoms had developed. After removing the plaster-of-Paris the flexion could be made to 80° before resistance was offered, extension to 180°, abduction two-thirds the normal. There was $\frac{3}{4}$-inch atrophy of the thigh, no pain, no tenderness. Another radiogram was taken. Radiogram No. 4. Very little change was noted in the negative, and it is not reproduced now. Suffice it to say that the case did so well and the parents were so fully impressed with the necessity for prolonged immobilization as a protection to the joint that I have not insisted on his being brought to New York since October 29, 1907, when a new plaster was applied on the eve of his departure for the West, and correspondence has taken place of personal observation. Quite recently in order to save a long trip across the continent, I readily

acceded to the father's request to have observations made in Denver and have this reported. We were both fortunate in securing the services of one of my former house-surgeons, Dr. S. Fosdick Jones, a resident of Denver, and he made the most thorough examination and had a radiogram made and renewed the plaster-of-Paris. The radiogram taken by Dr. S. B. Childs, of Denver, is very good and but confirms those taken by Caldwell in New York. Dr. Jones reports to me in detail and shows after all this immobilization an extension to 180°, a flexion to 90°, a normal

CASE III.—Showing Tubercular lesion just above acetabulum.

range of abduction and adduction, and no lameness. The thigh is $\frac{1}{4}$-inch smaller than its fellow, the calf is the same size.

The following case presents points of interest and will bear reporting.

CASE IV.—*Right hip disease; abscess aspirated from time to time; final disappearance; traction at first, later immobilization in plaster-of-Paris for a long time; result, cure with restoration of function, no deformity, no lameness.* A girl, 5 years of age, coming under observation on July 11, 1904, gave this history. In May of this year she had measles, followed by a limp in left hip,

pains at night and increasing disability. The nates are flattened, ilio-femoral crease lower than normal, reflex spasm when any movement of the hip approaches the normal, a flexion deformity already of 170° without shortening or atrophy. The diagnosis is made easily, and a traction hip splint ordered. This was soon applied, and in the latter part of September it was noted that she wore the splint without discomfort and was resting at night without pain. Two months later it was noted that the hip was quite sensitive and that no motion was tolerated; thickening in Scarpa's space with apparent fullness over outer side of thigh. These signs gradually increased and she had an uncomfortable winter notwithstanding the good care given the splint, the traction being always operative. By June, 1905, an abscess involving Scarpa's space and the fascia lata was quite tense, and aspiration got about 4 ounces of pus. A short plaster-of-Paris spica was applied and worn three weeks when the traction was reapplied. During the following fall and winter the traction seemed necessary to secure relief from pain and the perineal strap induced troublesome ulcers. In May, 1906, another operation was done and about 3 ounces of pus evacuated. Finally the perineal excoriations gave so much trouble that the traction splint was replaced by a short plaster-of-Paris spica. A radiogram at this time was taken and is here reproduced. The limb was held at 180°, but no motion could be made without pain, there was no shortening. No high shoe or crutches were employed and she walked quite easily. Notes taken quite regularly show gradual improvement in the girl's condition, and in October, 1907, it was recorded that she had walked all summer with scarcely a limp, that the plaster-of-Paris was removed, no signs of abscess, extension to 180°, flexion to 150°, abduction and adduction fair, no shortening. A muslin spica bandage was applied, and it was unnecessary to re-apply the plaster from this time on. The last note made was on May 11, 1908, when extension was normal, flexion to 110°, limbs equal in length, right thigh $\frac{3}{4}$-inch smaller than left, and right calf $\frac{1}{4}$-inch smaller than left, knee $\frac{1}{2}$-inch smaller. Abduction and adduction one-half normal, rotation good, very slight limp, no pain at any time, able to put on her shoes and stockings in the normal way.

Case V.—*Hip disease; very slow invasion; traction for eighteen months; plaster-of-Paris spica two and three-fourth years; result, fair range of motion, one-half inch shortening.* A boy, 5 years of age, from Lynchburg, Virginia, was seen first on April 30, 1903. The disease then was of $1\frac{1}{2}$ years' standing, traction splint worn most of the time. He seemed to have been so near well that the

apparatus was discontinued when a relapse occurred. When I saw him first, there was no shortening, reflex spasm on extension beyond 170° and flexion beyond 110°, all other movements induced spasm. Radiogram at this time showed slight atrophy of the head and neck but nothing more. A traction splint was employed with temporary relief, then later with recurrence of pains, and when removed on October 3, 1904, the range of motion had diminished from 175° in extension to 165° in flexion, and all other movements were markedly restricted. A radiogram was taken at this time showing slight involvement of the head and neck, and a plaster-of-Paris spica bandage was applied. When I saw him again on September 29, 1904, the plaster-of-Paris had been removed by a local physician, and use of the limb thus unprotected brought on deformity, and the limb was held flexed at an angle of 150°. There was then about ¾-inch shortening of the limb. Under an anesthetic the limb was pulled down into good position and plaster-of-Paris reapplied. In March, 1905, he was troubled with night cries, tenderness in the joint, etc., so the plaster-of-Paris was carried to the ankle. This was changed on June 15, 1905, relief having been obtained, but shortening continued. In February, 1906, an abscess had appeared and was aspirated. In March, it had broken and some sterile pus was forced out by pressure, but healing soon took place. Prior to this date the traction splint had been used to supplement the plaster-of-Paris, and was now removed, and a short spica alone was employed. It would be tedious to relate the notes from time to time. They simply show a steady improvement until October 11, 1907, when the plaster-of-Paris was removed. He had then extension to 180°, flexion to 140°, ½-inch shortening. A radiogram showed no further involvement. He was put in the hands of a careful masseuse, and a lift was put in the right shoe. The last note was in February, 1908, when motion had increased to 140° in flexion and 180° in extension, motion was increasing. Active movements but very little passive movements were allowed, and he is in a fair way, I believe, to almost a complete recovery with restoration of functions.

At my clinic at the College of Physicians and Surgeons this treatment has been carried out for several years by my chief of clinic, Dr. Charles Jaeger. He is quite enthusiastic over it, and has furnished me some notes which may be briefly abstracted as follows.

Case VI.—A boy, age 8 years, wore a hip splint for 8 months and then plaster-of-Paris, 7 months after removal of the splint be-

cause of a relapse. An abscess was opened aseptically and soon closed in September, 1903. Plaster-of-Paris was worn until December, 1904, when he walked very well without any support, and he had a very fair range of motion.

CASE VII.—A boy, 9 years of age, had signs of hip disease in July, 1905, had $\frac{3}{4}$-inch shortening, muscular spasm, etc. He wore a short spica until November 17, 1907, when he walked with a slight limp and full range of motion.

CASE VIII.—A girl, 10 years of age, duration of symptoms 2 years, had hip disease with $\frac{1}{4}$-inch real shortening and limb held at an angle of 150°. A radiogram showed erosion of the head of the femur. A plaster-of-Paris spica was applied and continued for one year, when a cure seemed complete and she had free motion in all directions.

My house-surgeon, Dr. Grigsby, of the Hospital for Ruptured and Crippled, has furnished me some notes, but as they are incomplete, cures having not been sufficiently long established, they are not recorded in this paper.

Time and space prevent me going into lesions of the knee and ankle-joints. Suffice it to say, the results have been very good under this method. I could report at length, but will reserve statistics for some further occasion, but at present am thoroughly convinced that immobilization is one of the most important factors in tuberculous ostitis of joints. Let it be understood that this is not intended to do away with traction by weight and pulley or apparatus, but this communication is intended to show the value from clinical records of the weight-bearing function when the joint is well immobilized.

V.

A CONTRIBUTION TO THE STUDY OF TUBERCULIN IN ORTHOPEDIC PRACTICE.*

BY CHARLES OGILVY, M. D., NEW YORK.

The Calmette Ophthalmo-tuberculin Test.

The recent observations of Calmette and Wolf-Eisner on the conjunctival reaction to tuberculin in cases of tuberculosis have attracted universal attention.

This method of diagnosis was suggested by Wolf-Eisner at a meeting of the Berlin Medical Society, when the subject of von Pirquet's tuberculo-cutaneous reaction was being discussed. About the same time (June, 1907) Calmette, of Lille, France, described the method and reported upon the reaction which had followed the administration of the instillations in 25 cases.

Sufficient time has now elapsed to enable further observations to be made upon the subject. From these we are able to form an opinion of the value of this means of diagnosis.

The cases tabulated below have been chosen with the object of determining the efficiency of this method of diagnosis in cases of bone and joint tuberculosis.

Preparation of Tuberculin Used.—The tuberculin preparation employed by Calmette is a 1 per cent. aqueous solution of the precipitate obtained on the addition of alcohol to tuberculin. We are indebted to Dr. William H. Park for supplying us with this preparation. A quantity of Koch's old tuberculin (concentrated) is poured into two volumes of 95 per cent. alcohol, allowed to settle and filtered per paper. The sediment is washed with 70 per cent. alcohol, until the filtrate runs clear. It is then pressed between layers of filter-paper, to remove excess of moisture scraped into a dish, dried in vacuo over sulphuric acid, and

*Candidate's thesis.

broken up in a mortar. Solutions of the powder are made in sterile normal salt solution of 1 per cent. by weight, boiled on a water-bath, filtered, and diluted as required. The solution is then put up in the quantities desired, these receptacles being sealed and boiled ten minutes.

The reliability of the test depends largely upon the preparation used and the technic employed.

Technic.—The importance of proper technic has not been sufficiently emphasized.

The patient should lie down and the conjunctivæ of both eyes be carefully examined and any differences noted. The measured drop of tuberculin should then be instilled in one eye, with a finely drawn pipette held parallel with the eye. The lower lid is drawn well outward and downward away from the eye-ball, when the tuberculin is dropped into the bottom of the conjunctival sac. Special care should be taken that no part of the drop is retained on the edge of the eye-lid or upon the eye-lash, as may result from a sudden movement of the eye-lid or head of the patient. Should the patient cry, the test is of little value. The subject may not actually shed tears, but there may be sufficient lachrymation to half fill the conjunctival cul-de-sac; if the drop is then instilled it may float upon the surface of the secretion and when the traction on the lid is released, be expelled to the eye-lash, from whence it is wiped off a few minutes later by the patient. It is therefore essential to have as little lachrymation as possible.

The Reaction.—The reaction has been fully described by several writers. A brief description of the changes taking place will, therefore, here suffice.

As a rule, between the third and eighth hour after the installation, there appears a slight swelling and a diffuse redness is noticed spreading over the inferior tarsal conjunctiva. These changes are accompanied by a slightly increased lachrymation and sometimes by a sense of irritation and burning. The congestion increases, extending upward over the ocular conjunctiva. The redness deepens in color and fine whitish fibrinous filaments are seen on the eye-ball and palpebral conjunctiva. Lachrymation is now much increased. In the more severe form of reaction these symptoms

are exaggerated. There is an abundant mucopurulent secretion, slight photophobia and tenderness on pressure, marked swelling of the lids and a more generally diffuse conjunctival involvement. The most intense reactionary symptoms usually develop in from 8 to 18 hours.

The cornea, iris and deeper tissues are apparently not affected, nor has the writer noted any pupillary changes.

The acute stage of the reaction usually lasts but a few hours. The eyes return to normal in from 1 to 4 days. In some cases a mild conjunctivitis may remain for from 2 to 3 weeks.

Untoward Effects.—Several observers have reported unfavorable results, such as long-continued conjunctivitis, keratitis, temporary loss of vision and ulceration. The test has even been termed a dangerous procedure. The contraindications are the inflammatory affections of the eye and eye-lids, conjunctivitis, blepharitis, keratitis, iritis, and trachoma. If these are carefully avoided and the preparation employed has been properly prepared and a small drop used, it would seem that there should be no apprehension of any unfavorable sequelæ. This opinion the writer has formed from a personal knowledge of over two hundred cases.

It will be noticed that in the following series there have not been any doubtful reactions recorded. All such are practically negative and have been so considered.

It is very important that a thorough examination of the patient should be made that we may know whether or not some foci of tubercular infection are present other than that of the bone or joint in question.

There appears to be no relation between the intensity of the reaction and the extent of the involvement or acuteness of the disease. For example, one case of acute Pott's disease on different occasions reacted but mildly, whereas other cases without any acute symptoms gave a very severe reaction.

In all the instances when a negative or doubtful reaction followed the first instillation and a positive reaction had resulted from the second instillation, the patient had cried the first time, which probably accounted for there having been no reaction.

Cases.

	NAME	AGE	DIAGNOSIS	REACTION*	REMARKS
1	A. R....	3	Pott's disease (3d dorsal).	+	
2	A. B....	7	Pott's disease (high dorsal).	+	
3	F. R....	13	Pott's disease.	+	
4	A. W...	3½	Rt. hip (with discharging sinuses).	+	
5	E. S....	3½	Pott's disease (12th dorsal).	+	Three instillations. After first instil. there was no reaction, the child having cried at the time of instillation. A decided reaction followed the 2d and 3d instil. which were given 4 weeks apart.
6	G. W...	5	Pott's disease (12th dorsal).	+	
7	J. Y....	13	Pott's disease (1st and 2d lumbar).	++	
8	P. S....	3	Pott's disease.	+	Two instillations. First "doubtful."
9	C. S....	4	Pott's disease (6th and 7th dorsal).	+	Two installations. Reaction delayed in both instances.
10	S. L....	11	Pott's disease (5th and 6th dorsal).	+	
11	J. N....	11	Tub. L. knee (discharging sinuses).	++	
12	A. G....	7	Hip disease (right).	+	
13	J. C....	15	Pott's disease (4th and 5th dorsal).	++	Disease inactive for past five years.
14	C. McD.	6	Hip disease (left).	+	Slight conjunctivitis for three weeks.
15	J. K....	2½	Tub. dachtylitis.	+	
16	L. A....	..	Tub. elbow.	++	
17	T. N....	3	Pott's disease with abcess.	+	
18	M. S....	4	Double hip disease.	—	Two installations. See conclusions below.
19	L. S....	3	Hip disease (right).	+	
20	R. C....	3	Pott's disease (cervical).	+	First installation negative. 2d installation 11 days later. Reaction limited to lower lid below the pupil, with a definite line of demarcation.
21	S. H....	6	Hip disease (right).	+	
22	W. B...	7	Hip disease (right).	++	
23	J. B....	2½	Tub. ankle.	+	
24	C. H....	10	Left knee (traumatic).	—	Two installations, both negative.

* — Negative, + Positive, ++ Intense reaction.

	NAME	AGE	DIAGNOSIS	REACTION*	REMARKS
25	J. G....	3	Pott's disease (1st dorsal).	+	
26	M. H...	9	Hip disease (right).	+	
27	M. S....	12	Hip disease (right).	+	
28	S. Z	7	Pott's disease.	+	Two instillations. First negative.
29	L. S....	10	Traumatic inflammation left knee.	—	Injury two weeks previously.
30	D. C....	5	Pott's disease.	+	Two instillations. First negative.
31	G. S....	3½	Coxa vara.	—	
32	J. L....	2	Tub. glands of neck.	+	
33	E. L....	3	Acute osteomyelitis (tibia).	—	
34	J. C....	3½	Rickets.	—	
35	R. M...	3	Rickets.	—	
36	J. P....	3	Rickets.	—	
37	L. C....	7	Tub. glands of neck.	+	
38	C. F....	3	Anterior poliomyelitis.	+	No evidence of any tubercular infection; being kept under observation.
39	W. M...	2½	Bronchitis.	—	
40	S. S	3	Empyema (staphylococci).	—	

* — Negative, + Positive, ++ Intense reaction.

When a second instillation is necessary, it should not be given in the same eye.

In the case of double hip disease in which the reaction was twice negative, the patient was in a low condition and had but little resisting power. He died a few days later, from which it may be reasonably inferred that the reactionary powers were at too low an ebb to respond to the test.

Some would account for the negative reaction reported in cases known to be tubercular, as being due to a condition of low resistance —low opsonic index—as occurs in the negative phase. This the writer believes to be the case in such instance as the one just cited; but the reactive powers, or the opsonic index, must be very low indeed, in his opinion, to prevent a reaction in cases of tubercular bone disease, and we must look for some other cause than this for the negative results reported.

To hypersusceptibility or anaphylaxis has been attributed the cause of these reactionary changes. Another theory has been ad-

vanced that a new product is produced, the presence of which gives rise to the local inflammatory reaction. These theories, however, do not satisfactorily explain the phenomena.

Its exact value and place in orthopedic practice, time and further experience will teach us. But we have here a means of diagnosis which, though not infalliable, is conclusive evidence when coupled with clinical symptoms, and in doubtful cases will go far to enabling us to make a definite diagnosis. This being so, we have a most valuable asset in our practice and one whose practical application can be very readily utilized.

The Treatment of Tubercular Bone and Joint Disease with Small Doses of Tuberculin Controlled by the Opsonic Index.

A preliminary report on this subject, based upon a study of six cases, has been presented by Dr. T. Homer Coffin and the writer before the New York Academy of Medicine some months ago. From this and succeeding investigations the conclusions here formulated have been deducted.

"To Wright is due the credit of proving the efficiency of very small doses of tuberculin and the definite estimation of their influence on what he has termed the opsonic index. Wright considers that rest in bed should be regarded as a therapeutic measure in general tuberculosis to end the autoinoculation which follows exertion, and that if to this could be added the belief that the cure of bacterial infections depends neither on the storage of fats nor on the bronzing of the skin nor yet on the breathing of pure air, but on the destruction of the invading bacteria by the antibacterial substance in the blood, we should have come close to the truth."

The principle underlying the treatment of localized tuberculous infection Wright enumerates as follows:

1. The tuberculo-opsonic index of the blood in these cases appears to be uniformly inferior to that of normal blood. 2. The immunizing stimuli which are required for raising the opsonic power of the blood and for the maintaining it at a high level here make default. 3. The tubercle bacilli are circulating them-

selves in the focus of infection under conditions which are more favorable to their growth than those which obtain in the cases of the circulating blood. 4. An increase in the opsonic power of the blood can be achieved and maintained by the inoculation of a series of appropriately adjusted and interspersed doses of tubercle bacilli.

It is too often forgotten, however, that the localized infection has been inoculated previously from the blood stream of the general circulation, which, therefore, has at some time been the host of the tubercle bacilli.

It is true that such may not be the case at the time of treatment of the local infection; nevertheless, it must be remembered that the local infection is in the large majority of cases a secondary infection, the primary being in the lungs, bronchial glands, the mesentery or kidney. The primary focus remaining dormant, may be recognized only at autopsy. Sometimes the primary focus may disappear altogether. These are important factors to be considered in the treatment of this subject, for any individual focus of disease cannot be completely isolated without due regard to its close relationship to the existing general systemic condition, by reason of which we have the effect of the treatment reflecting directly and indirectly on the diseased area in evidence.

The tubercle-opsonic index has been shown to be below normal in most cases of localized tuberculosis, though it may fluctuate if the process is active and there is autointoxication.

For diagnostic purposes, however, the opsonic index, though an aid, is of little practical value, for added to the difficulty of technic, there is a certain percentage of cases (about 25) which will give either a normal or a slightly above normal index.

Difficulty of Technic and Sources of Error.—We shall not enter into a detailed description of the technic here. The three preparations employed are *the serum, the leukocytes* and *the emulsion of dead bacilli.* Equal quantities of these, after having been thoroughly mixed, are incubated for fifteen minutes, at the end of which time the leukocytes will have ingested a number of the bacilli, the comparison being then made between this number and

the corresponding number in another test in which control serum has been used. The serum is easily obtained and pool serum should always be used. The emulsion of bacteria is made from bacilli which are heated to 100° C. for ten minutes and then ground up thoroughly and made into a fine emulsion by the addition of salt solution (1.5 per cent.). This is then centrifuged and the supernatant opalescent emulsion is used. This should be free from clumped bacilli. It must be of equal opalescence throughout, otherwise when drawing off the required quantity in several pipettes, we may draw up the emulsion in different densities, which will alter the resulting index.

To obtain the leukocytes it is best to use a tube of about half the caliber of an ordinary test-tube.

When pipetting up each of these preparations one must be careful that exactly equal quantities are withdrawn, for herein lies another source of error.

The time of incubation must also be carefully taken. When a pipette is taken out of the incubator, its contents should immediately be smeared on a glass slide, thus preventing the possible continued ingestion of bacteria by the leukocyte.

When counting the bacilli the same method should be used throughout. If the greater part of a bacilli is within the leukocytes, count it as being within. If doubtful, do not include this leukocyte in the count.

Though the technic presents these several difficulties and liability to error, nevertheless, accuracy can be attained and a reliable index obtained.

There is no doubt that "an increase in the opsonic power of the blood can be achieved and maintained by the inoculation of a series of appropriately adjusted and interspersed doses of tuberculin bacilli," except in cases of extreme debility and emaciation with accompanying degenerative changes in one or more organs.

In cases where we have had discharging sinuses with mixed infection we have been able to raise the index, but with this rise there has not been any perceptible change in the general or local condition.

Except in such cases of mixed infection, however, the rise of the index has been accompanied by a corresponding improvement, both generally and locally. This fact is most significant and is of much more practical value than the opsonic index.

From the minimum dose of 1–1000 mg. there is little or no reaction; very rarely do we see the distressing symptoms of reaction which frequently resulted from the larger doses previously employed with less beneficial results.

An interval of 10 days elapsing between each injection allows ample time for the negative phase to have given place to the positive. This usually takes place the second or third day.

Conclusions.

1. By means of the opsonic index we have learned the importance of these small doses of tuberculin and the time at which they should be administered. But this having been learned, it is by no means necessary, nor is it practical to follow up the treatment with control indices.

2. For the diagnosis of tubercular bone and joint disease the opsonic index is of little practical value. (To this I add the conclusions enumerated in the report above referred to.)

3. Tuberculin in small doses at proper intervals is of undoubted value in the treatment of selected cases of tuberculous bone and joint infections.

4. The rise of the opsonic index is accompanied by an improvement in the local and general conditions of the patient, if no secondary infection exists.

5. While there are discharging sinuses and mixed infections, the opsonic index may be raised by the use of tuberculin without an accompanying improvement of the general or local conditions (specificity).

6. The opsonic index will prove of value in determining the advisability of discontinuing mechanical treatment.

7. The opsonic index is of value in determining the prognosis in tuberculous bone and joint disease.

To Dr. T. Homer Coffin am I much indebted for his continued assistance and cooperation. I wish to also thank Drs. H. L.

Taylor, V. P. Gibney, R. Whitman, W. O. Plimpton and H. D. Chapin from whose services at the Ruptured and Crippled and New York Post-Graduate Hospitals, respectively, a number of the cases have been taken.

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VI.

TUBERCULIN IN ORTHOPEDIC SURGERY.*

Clinical and Laboratory Reports.

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Medical literature is so replete with the history of the discovery of opsonin in the blood, with descriptions of methods of its determination and ways of manufacturing vaccines for the purpose of its augmentation, that it is unnecessary to preface this paper with such details. Both clinical and laboratory reports will be given of the cases in this series in such a way as to be as concise as possible and yet offer a clear picture of the procedure used and the therapeutic result.

All these cases were patients of the New York State Hospital for the Care of Crippled and Deformed Children and were receiving orthopedic treatment under the supervision of the Surgeon-in-chief, Dr. Newton M. Shaffer. This hospital is situated at West Haverstraw, N. Y., upon a plot of about sixty acres. The altitude is 160 feet. It is upon a ridge which affords a dry soil and is swept by winds. The topography of the surrounding country is such that gales are diverted from the site and there seems to be less rainfall than at towns a few miles distant.

The patients live a practically out-door life. Cots in a three-sided and roofed shed in the winter, and under a walled tent, usually with the sides rolled up, in the summer, are used for bed patients. The rest are allowed to play with almost no restriction, except that enforced by portable apparatus. Very acute conditions, marked deformity, and intercurrent attacks of gastro-enteritis and such diseases as children are prone to incur, are the only causes for keeping a patient in bed. At night the wards are venti-

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lated freely by opening all the windows. Steam heat in cold weather keeps the fully ventilated wards at a temperature of about 60° F.

The diet these patients receive is not a forced milk or a milk-and-egg diet. Breakfast consists of bread and butter, eggs, milk, and milk and coffee; dinner of bread and milk, meat or fish, vegetables, milk, rice, or tapioca pudding; supper of bread and butter, milk, fruit, and sometimes cheese.

The resident surgeon examines the apparatus of each individual patient and sees that it is properly applied. He re-adjusts the apparatus or repairs broken parts at any time necessary. Where deformity is being corrected or abscesses are present, a brace is closely inspected several times each day. The attending surgeons make four to six visits weekly, at which times rounds are made in a systematic manner. The nurses, since they are selected from a civil service list and are rather poorly paid, are not familiar with this class of work when they enter on their duties and usually leave for better positions about the time they become proficient and trustworthy.

These details are entered into fully that all the possible therapeutic factors may be known.

The laboratory work was done at the Cornell Medical College. The distance of the hospital from the laboratory, 36 miles, necessitated some delay in delivery of specimens, but by wrapping the capsules in cotton for transportation, and putting them on ice as soon as possible, it is not thought that this interfered with correct readings of the indices. The tuberculin used was obtained from Trudeau's laboratory and was made from their number 11 stock. One c.c. of this contains .0047 gms. of dry substance. The tuberculin, after being properly diluted at the laboratory was kept in an ice box at the hospital. Injections were made with an ordinary hypodermic needle—usually a glass syringe being used. Lysol was dropped upon the rubber cap of the tuberculin bottle, which was then punctured by the needle and the desired amount drawn into the barrel of the syringe. The site of the injection was usually prepared only with alcohol. The injections were subcutaneous, not intermuscular, and were given alternately into the

right and left arms. The time of injection was in the afternoon and had no reference to exercise or eating, before or after administration. In the following case reports we offer for comparison the condition of the patient at the time of admission, at the time of the first inoculation with tuberculin and at the time of writing this paper.

Case I.—Age, 10 years. Diagnosis, hip-joint disease (right). Duration, 9 years. Admitted Oct. 10, 1903.

Condition on Admission. A. G. E. 160°. A. G. F. 150°. Marked spasm. Very slight motion in any direction. Shortening of right leg, one-half inch. Swelling on anterior aspect of joint.

Condition at First Injection. Since admission patient has had seven abscesses. A marked feature of her progress has been severe intermittent pain, demanding narcotics upon several occasions. At present there are three discharging sinuses. Joint sensitive. Muscular spasm marked. Evening rise of temperature to 100–101°. Patient has been steadily losing weight and anemia is marked.

The first injection was made on Jan. 26, 1907, when .001 mg. was administered. Fourteen injections were given. The last one was on March 16, 1908, when the dose was .55 mg.

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Present Condition, March 13, 1908. Abscess in right gluteal region is discharging freely. Joint not so sensitive. Three-quarters of an inch shortening. Patient has gained in weight for the past three weeks.

From the date of admission to the date of the first injection, three years and three months, this patient's course was downward. No other therapeutic factor as introduced when tuberculin treatment was begun. After two months treatment a decided improvement was noticeable in her condition. This improvement continued for six months longer, without further injections of tuberculin. Nine months after the last injection her improvement stopped and her condition was becoming worse.

Tuberculin treatment was instituted again on Dec. 15, but continued for only three doses, when it was stopped until two months later.

Case II.—Age, 12 years. Diagnosis, hip-joint disease (left). Duration, five months. Admitted July 19, 1905.

Condition on Admission. One-half inch real shortening. Ten

Note.—A. G. E. = angle of greatest extension. A. G. F. = angle of greatest flexion.

degrees of abduction. A. G. F. 155°. A. G. E. 170°. Two inches atrophy of thigh. Swelling just below Poupart's ligament. Spasm marked. General condition good.

Condition at First Injection. All sinuses closed. Some thickening and induration over trochanter major. Three-quarters of an inch real shortening. No flexion deformity. A. G. F. 160°. A. G. E. 180°. One inch atrophy of thigh. Sensitiveness of joint subacute. General condition good.

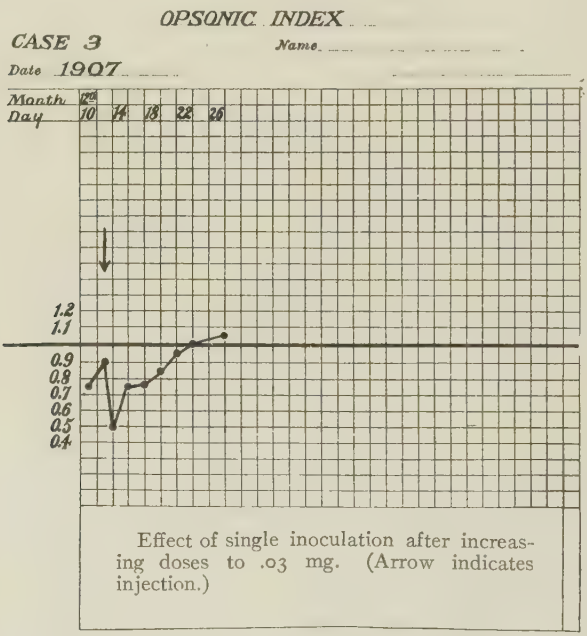
TABLE SHOWING DATES OF INJECTION AND DOSAGE OF TUBERCULIN.

	Tuberculin.		Tuberculin.
Jan. 2, 1907.	.001 mg.	July 26 1907.	.001 mg.
" 5, "	.002 "	" 29, "	.002 "
" 9, "	.0033 "	August 2, "	.003 "
" 12, "	.0046 "	" 5, "	004 "
" 16, "	.006 "	" 9, "	.0053 "
" 23, "	.0073 "	" 12, "	.0066 "
" 26, "	.0086 "	" 16, "	.008 "
" 30, "	.01 "	" 19, "	.01 "
Feb. 2, "	.0113 "	" 30, "	.02 "
" 6, "	.0156 "	Sept. 6, "	.033 "
" 9, "	.013 "	" 9, "	.0046 "
" 13, "	.026 "	" 13, "	.06 "
" 16, "	.04 "	" 20, "	.073 "
" 20, "	.056 "	" 25, "	.08 "
" 23, "	.066 "	Oct. 3, "	.053 "
" 27, "	.08 "	" 14, "	.053 "
March 2, "	.46 "	" 25, "	.086 "
" 6, "	.6 "	Nov. 4, "	.13 "
" 9, "	.73 "	" 15, "	.066 "
" 16, "	.1 "	" 25, "	.046 "
(Tuberculin discontinued till July 3.)		Dec. 11, "	.033 "
		" 20, "	.0033 "
July 3, 1907.	.00013 mg.	" 30, "	.02 "
" 8, "	.00033 "	Jan. 10, 1908,	.02 "
" 12, "	.0005 "	" 27, "	.0066 "
" 15, "	.00066 "	Feb. 14, "	.013 "
" 19, "	.00086 "	March 2, "	.013 "

Present Condition, March 13, 1908. No evidence of abscess. One inch real shortening. Deformity almost overcome. A. G. F. 135°. A moderate amount of rotation. General condition excellent.

In comparing the conditions on admission and at the first injection, it will be seen that this patient had greatly improved. On account of the swelling about the joint it had been necessary to bend the hip-splint outward four inches. It was a remarkably large abscess, even for a severe hip infection. This had almost

disappeared when tuberculin treatment was begun. On March 13, 1908, one year and three months after the first injection, the patient was still further improved. It might be said that the rate of improvement before the use of tuberculin was such as to give one reason to expect the condition as found fourteen months later. Yet it should be remembered that there was at no time a relapse, that the abscess was not fully absorbed when tuberculin treatment was begun and that the improvement was from a serious condition to one promising cure with a useful hip.



Effect of single inoculation after increasing doses to .03 mg. (Arrow indicates injection.)

Case III.—Age, 8 years. Diagnosis, hip-joint disease (right). Duration, seven months. Admitted March 22, 1906.

Condition on Admission. One inch apparent lengthening. One-quarter inch real shortening. Twelve degrees of abduction. One-half inch atrophy of thigh. Limitation of motion in all directions. Spasm very acute. Slight fullness on anterior and outer aspect of upper part of thigh. Night cries.

Condition at First Injection. Has a large abscess (unbroken) on anterior and outer aspect of upper part of thigh. One-quarter inch real shortening. Three-quarters of an inch apparent lengthening. Ten degrees of abduction A. G. E. 150°. No

movement. Spasm acute. General condition good. Wears hip brace and is on an incline plane.

Tuberculin treatment was begun Dec. 6, 1906. On March 16, 1907, the twenty-fifth injection was given, which was a dose of .1 mg. The injections were then omitted until July 1, when .00013 mg. was given. From then until the present date tuberculin has been administered.

Present Condition, March 13, 1908. All evidence of abscess has disappeared. No deformity. A. G. F. 135°. Thirty degrees of abduction. Fair amount of rotation. Spasm slight and only elicited on reaching limit of motion. General condition excellent.

This patient had eight months of hospital treatment before tuberculin was begun. During that time the deformity was somewhat reduced but the abscess formation had greatly increased and the acuteness of the spasm had not subsided. One month after the first injection, improvement was noticed and continued uninterruptedly. The filtrate was administered from Sept. 30 to Oct. 25 to see if it would reduce the temperature but no effect was produced.

Case IV.—Age, 5 years. Diagnosis, hip-joint disease (left). Duration, one year. Admitted Nov. 4, 1901.

Condition on Admission. One-half inch real shortening. A. G. F. 150°. A. G. E. 140°. Ten degrees of abduction. Joint acute. Night cries. Large fluctuating mass on outer side of upper part of thigh. General condition fair.

Condition at First Injection. Sinuses all closed. Two and a half inches real shortening. A. G. F. 145°. A. G. E. 180°. Joint admits of 15° of abduction and adduction. Rotation free.

Administration of tuberculin was begun Nov. 4, 1907. Seventeen injections have been made. The last dose was .0013 mg.

Present Condition, March 13, 1908. Two and a half inches shortening. No deformity. Abduction 25°. Adduction 15°. Rotation free. No spasm. General condition excellent.

Six years of hospital treatment had reduced this very acute hip with abscess formation to a subacute, more movable condition, with abscesses and sinuses cleared up. The following four months of tuberculin treatment showed a continuation of the improvement with a little more rapidity, it would seem, than had taken place previously.

Case V.—Age, 4 years. Diagnosis, hip-joint disease (right), and knee-joint disease (left). Duration unknown. Admitted March 11, 1907.

Condition on Admission. About one-half inch real shortening

of right limb. A. G. F. 160°. A. G. E. 160°. Twelve degrees of abduction. Joint spasm acute. Knee flexed to right angle; acutely painful. Night cries. General condition very poor.

Condition at First Injection. About one-half inch shortening of right limb. No movement. Nine degrees of abduction. A. G. E. 165°. Joint spasm subacute. Knee flexed to about 30°. Sensitiveness acute. Night cries. General condition fair.

Injections of tuberculin were begun on Dec. 15, 1907, when .0002 mg. was given. The fifteenth injection, on Feb. 17, 1908, was .00066 mg.

Present Condition, March 13, 1908. Hip: Very little shortening, if any. A. G. F. 155°. A. G. E. 170°. Twenty-five degrees of abduction. Spasm subacute. Left knee: Atrophy marked. Slight swelling. Flexion of 10°. No subluxation. Five degrees of motion. General condition good. Increasing in weight.

Nine months of hospital treatment without tuberculin produced improvement in both hip and knee but not so marked as occurred during the following three months when tuberculin was administered. Abduction of the hip increased but otherwise the deformities of both joints lessened.

Case VI.—Age, 11 years. Diagnosis, hip-joint disease (right). Duration, 7 years. Admitted Jan. 20, 1905.

Condition on Admission. Two inches real shortening. Eighty degrees of abduction. A. G. E. 140°. Atrophy of thigh one and a half inches. Joint fixed by muscular spasm. No abscess.

Condition at First Injection. Two inches real shortening. Fifteen degrees of adduction. A. G. F. 125°. A. G. E. 160°. Three inches atrophy of thigh. Spasm of joint, subacute.

Tuberculin was begun December 16, 1907. Eighteen injections were made. The last dose was .00033 mg. The method was by repeated small doses.

Present Condition, March 17, 1908. Two inches real shortening. A. G. F. 125°. A. G. E. 170°. Twenty-degrees of abduction. Ten degrees of adduction. Three inches atrophy of thigh. Sensitiveness of joint lessening. General condition excellent. Increasing in weight.

This patient was in the hospital nearly two years before tuberculin treatment was begun. During that time she improved but the improvement was not nearly so rapid as during the following three months when she received injections.

Case VII.—Age, 5 years. Diagnosis, hip-joint disease (left). Duration unknown. Admitted June 4, 1906.

Condition on Admission. No real shortening. Five degrees

of abduction. A. G. F. 170°. A. G. E. 170°. Joint very sensitive. Pain a marked symptom. No abscess. Looks delicate and anemic.

Condition at First Injection. No real shortening. Thirty degrees of abduction. A. G. F. 140°. A. G. E. 140°. One and a half inches atrophy of thigh. Sensitiveness of joint marked, the least movement causing pain. No abscess. Induration about the trochanter major. General condition fair. In bed with a hip-splint and on an incline plane.

Tuberculin was begun July 3, 1907. Twenty-nine injections have been made. The largest dose reached was in November, when .13 mg. was given. The amount was thereafter reduced.

Present Condition, March 13, 1908. One-quarter inch real shortening. Six degrees of abduction. A. G. F. 150°. A. G. E. 150°. Spasm, acute. Movement in any direction slight. General condition excellent.

The general condition of this patient upon admission was very poor. After being in the hospital for one year, the hip was worse than upon entrance. During the following eight months he received tuberculin and at the end of that time a decided improvement was noted in his hip and his general condition was excellent.

Case VIII.—Age, 8 years. Diagnosis, hip-joint disease (left). Duration, one year. Admitted September 14, 1906.

Condition on Admission. Condition of joint, very acute. Locked in spasm. A. G. F. 145°. A. G. E. 145°. Fifteen degrees of abduction. One-eighth inch real shortening. Night cries. General condition fair.

Condition at First Injection. Patient up on a portative traction apparatus. Motion slight. A. G. F. 175°. A. G. E. 180°. Five degrees of abduction. No real shortening. No night cries. One discharging sinus. Spasm subacute. General condition good.

Tuberculin was begun December 16, 1907 and eighteen injections were made, the dose being increased only to .00033 mg.

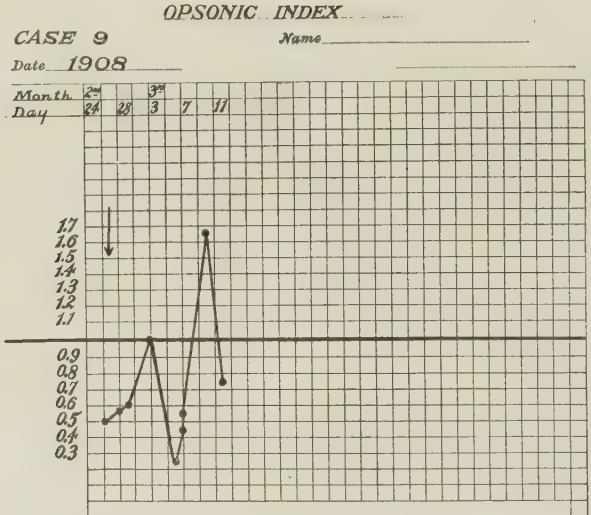
Present Condition, March 17, 1908. No real shortening. No deformity. A. G. F. 155°. A. G. E. 180°. Fifteen degrees of abduction and adduction permitted. Spasm subacute. Discharge from sinus much less. General condition excellent. Gaining in weight.

Here the result of fifteen months of hospital treatment may be compared to the result of three months of the same treatment plus tuberculin. A claim that tuberculin was of assistance in this instance would seem to be perfectly tenable.

Case IX.—Age, 10 years. Diagnosis, hip-joint disease (right). Duration, one year. Admitted November 4, 1907.

Condition on Admission. One-quarter inch real shortening. A. G. F. 140°. A. G. E. 150. Twenty degrees of abduction. Two inches atrophy of thigh. Joint spasm acute. General condition good.

Condition at First Injection. No real shortening. A. G. F. 135°. A. G. E. 150°. Twenty degrees of abduction. Two inches atrophy of thigh. Joint sensitive. General condition good.



Effect of single dose after 16 repetitions of same dose. (Arrow indicates inoculation—0.00066 mg.)

Tuberculin was administered from December 16, 1907 to March 16, 1908, eighteen injections being given in all. The beginning dose was .0002 mg.; this was gradually increased until .00066 mg. was given at the fourth dose, which amount was not exceeded.

Present Condition, March 17, 1908. No real shortening. A. G. F. 140°. A. G. E. 175°. Seven degrees of abduction. One and a third inches of atrophy of thigh. Spasm subacute. General condition excellent. Weight increasing.

This first six weeks of hospital treatment produced an improve-

ment which was not at all marked, while the following three months, during which injections were given, showed a pronounced alteration in all the symptoms. Six weeks is a short time in which to expect much improvement and yet, when no proper treatment had been received previously, more pronounced changes, it would seem, should have resulted, if three months later the diseased joint was to be so very greatly altered.

CASE X.—Age, 10 years. Diagnosis, hip-joint disease (left). Duration, about a month. Admitted May 17, 1907.

Condition on Admission. Slight limp. No real shortening. A. G. E. 180°. Four degrees of abduction. One-half inch atrophy of thigh. Slight spasm. General condition good.

Condition at First Injection. Deformity overcome. Spasm slight. General condition good.

Thirty-one injections of tuberculin were given from July 1, 1907, to March 2, 1908. The beginning dose was .00013 mg; the highest dose was .13 mg.

Present Condition, March 13, 1908. No flexion deformity. Good rotation. Flexion, abduction and adduction are free. No spasm. General condition excellent.

This was an early case with well-marked symptoms but good prognosis. The rapidity of the improvement may have been due in part to the tuberculin, but of itself this case would add little weight to a favorable estimation of its therapeutic value.

CASE XI.—Age, 7 years. Diagnosis, hip-joint disease (left). Duration, unknown. Admitted March 15, 1907.

Condition on Admission. One-quarter inch of real shortening. A. G. F. 140°. A. G. E. 140°. Twenty-five degrees of abduction. One and a half inches of atrophy of thigh. Joint is locked by muscular spasm. Well-marked induration over trochanter major. Pain is a marked feature. No abscess. Emaciated.

Condition at First Injection. One-quarter inch of real shortening. A. G. F. 155°. A. G. E. 155°. Twenty degrees of abduction. One inch atrophy of thigh. Joint spasm is still acute. No pain. Confined to bed with brace and on incline plane. General condition fair.

Tuberculin treatment was instituted July 1, 1907 with .00013 mg. and continued to March 2, 1908, when the dose was .013 mg. Twenty-nine injections were given during this period.

Present Condition, March 17, 1908. One-quarter inch of real shortening. Ten degrees of abduction. No flexion deformity. Movements in all directions are limited. Joint sensitive. General condition excellent.

This case has been in the hospital one year. He was admitted with a very acute hip. Deformity was marked, indications of abscess formation present and the general condition good. Tuberculin treatment has extended over the last eight months. His present condition shows a more marked improvement than could probably have been expected without the use of tuberculin. Yet it must be admitted that proper surgical and hygienic treatment does, at times, produce these happy results.

Case XII.—Age, 13 years. Diagnosis, hip-joint disease (right). Duration, ten months. Admitted August 14, 1907.

Condition on Admission. A half-inch of real shortening. A. G. F. 130°. A. G. E. 145°. Twenty degrees of abduction. Acute spasm. Intermittent pain at inner side of knee. Two inches atrophy of thigh. General condition good.

Condition at First Injection. A quarter-inch real shortening. A. G. F. 125°. A. G. E. 150°. Fifteen degrees of abduction. Spasm subacute. No pain. One and three-quarter inches atrophy of thigh.

Seventeen injections of tuberculin were administered from November 4, 1907 to March 2, 1908, beginning with .00013 mg. and increasing to .0013 mg.

Present Condition, March 13, 1908. One-quarter inch of real shortening. A. G. F. 125°. A. G. E. 155°. Eight degrees of abduction. One and three-quarter inches atrophy of thigh. Spasm lessened. General condition excellent.

The improvement in this case was continuous since the date of admission, but it cannot be said to have been more rapid under tuberculin treatment than it was before. However, as the good results of orthopedic treatment are always more rapid, when the treatment is first undertaken and slower as the more acute symptoms have abated, so the continuous, rapid improvement during the last five months under the administration of tuberculin might rightly be attributed in some measure to the tuberculin.

Case XIII.—Age, 9 years. Diagnosis, hip-joint disease (left). Duration, a few months. Admitted April 5, 1907.

Condition on Admission. Walks with a slight limp. Small, fluctuating swelling in left groin. No flexion, abduction or adduction deformity. Three-quarters of an inch atrophy of thigh. Slight abductor spasm on extreme flexion and inward rotation.

Condition at First Injection. Fluctuation in left groin on deep pressure. No deformity. One-half inch atrophy of thigh. Slight spasm. General condition excellent.

Tuberculin was administered from November 4, 1907, to March 2, 1908. Seventeen injections were made, the limits being .00013 mg. and .0013 mg.

Present Condition, March 13, 1908. All evidence of abscess has disappeared. No real shortening. No deformity. Spasm very slight. General condition excellent.

This case came to the hospital during the early stage of the disease. Improvement began immediately. It is impossible to demonstrate that the improvement, all the symptoms considered, was more rapid after the injections were begun, but it may be asserted that the swelling and induration subsided more decidedly and more rapidly after the first month of tuberculin treatment than before.

CASE XIV.—Age, 5 years. Diagnosis, hip-joint disease (left). Duration, one year. Admitted March 14, 1907.

Condition on Admission. One-quarter inch of real shortening. A. G. F. 120°. A. G. E. 150°. Six degrees of abduction. One inch atrophy of thigh. Spasm acute. No induration about joint or no signs of abscess. Intermittent pain. Night cries. Three months after admission spasm of the muscles of the left wrist was noted, with pain on movement. General condition fair.

Condition at First Injection. No real shortening. A. G. F. 125°. A. G. E. 165°. One-half inch atrophy of thigh. Six degrees of abduction. Spasm subacute. No abscess. No pain. No night cries. Spasm of wrist subacute. General condition excellent.

Tuberculin was begun July 1, 1907 with a dosage of .00013 mg. and continued till March 2, 1908, the highest dose being .02 mg. Thirty-one injections were given.

Present Condition, March 13, 1908. Patient wearing protective apparatus and using crutches. No real shortening. A. G. F. 130°. A. G. E. 180°. Four degrees of abduction. Spasm slight. Left wrist normal. No spasm elicited. General condition excellent.

This patient was in the hospital only three and a half months before tuberculin treatment was instituted. One year after admission his improvement was remarkable. However, the improvement in his condition, when he was not receiving injections, was likewise marked.

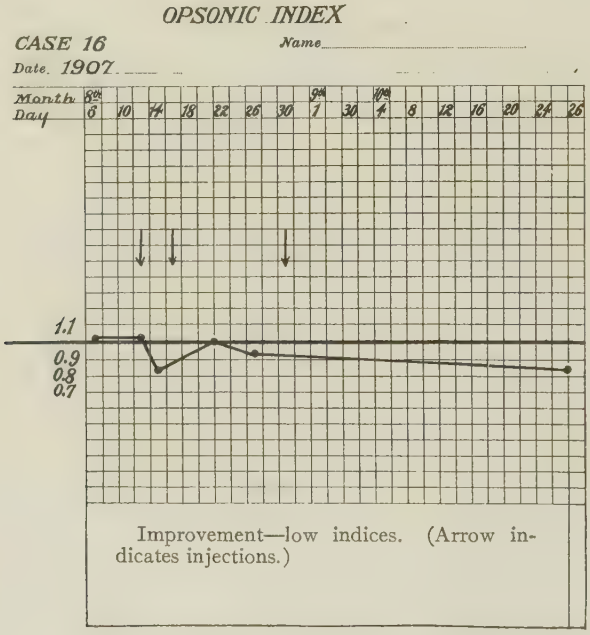
CASE XV.—Age, 9 years. Diagnosis, Pott's disease of mid-dorsal region. Duration, 5 years. Admitted May 16, 1906.

Condition on Admission. Marked kyphosis in mid-dorsal region. Spasm acute. Inter mittent pain. No abscess. No paralysis. Patellar reflexes not obtainable. General condition fair.

Condition at First Injection. Deformity being held. Spasm still marked. Patellar reflexes present. Patient is languid and prefers to lie down the greater part of the time.

Thirty injections of tuberculin were given from July 3, 1907 to March 2, 1908.

Present Condition, March 13, 1908. Deformity has not increased. No spasm. Is no longer languid. General condition much improved.



Improvement—low indices. (Arrow indicates injections.)

Case XVI.—Age, 4 years. Diagnosis, Pott's disease of lower dorsal region. Duration, about one year. Admitted January 13, 1905.

Condition on Admission. Three-quarters of an inch knuckling of lower dorsal vertebræ. Region of spine rigid. Spasm readily elicited. Pain occasionally. No abscess or paralysis. General condition fair.

Condition at First Injection. Deformity unchanged. Spasm can still be elicited. No pain. General condition good.

Twenty injections of tuberculin were given, in the same manner as in the preceding cases, over a period extending from August 12, 1907 to March 2, 1908.

Present Condition, March 13, 1908. Deformity has not increased. No spasm. General condition excellent.

CASE XVII.—Age, 4 years. Diagnosis, Pott's disease of lumbar region. Duration, 2 years and 9 months. Admitted April 11, 1905.

Condition on Admission. Slight deformity in lumbar region. Rigidity of part affected. Well-marked spasm. Double psoas spasm. No paralysis. No abscess. Night cries. General condition fair.

Condition at First Injection. Deformity slight. Immobilization at site of disease. Slight psoas contraction. Quite marked spasm of muscles of spine. General condition good.

Twenty-three injections were given from Aug. 12, 1907 to March 2, 1908, according to the previous method.

Present Condition, March 13, 1908. Deformity has not increased. No psoas contraction. Immobilization limited to the fourth and the fifth lumbar vertebræ and the sacrum. No spasm elicited. General condition excellent.

CASE XVIII.—Age, 4 years. Diagnosis, Pott's disease. Duration unknown. Admitted Sept. 29, 1908.

Condition on Admission. Two lesions exist: one in the dorsolumbar region; the other involving the seventh cervical to the third dorsal vertebræ. Upper lesion has about a half-inch kyphosis; spasm of muscles well-marked; great restriction of motion; no paralysis; no abscess; pain on motion. Lower lesion is not acute. General condition fair.

Condition at First Injection. Slight spasm in muscles at upper lesion. No pain elicited. There is flattening and some limitation of motion in the lumbar region but no spasm. General condition excellent.

Tuberculin was begun August 12, 1907, with a dose of .00013 mg. and on March 2, 1908, the twenty-second injection was given.

Present Condition, March 13, 1908. Upper lesion: no limitation of motion in rotation, flexion or extension; very slight kyphosis; no spasm. Lower lesion: flexion in lumbar spine limited; lateral motion free and extension good; no spasm. General condition excellent.

CASE XIX.—Age 9 years. Diagnosis, Pott's disease of upper dorsal region. Duration, one year. Admitted Septtember 14, 1906.

Condition on Admission. Well-marked kyphosis at upper dorsal region. Spasm marked. Slight intermittent pain at site of lesion. No abscess. No paralysis. General condition good.

Condition at First Injection. No increase in deformity. Spasm much less acute. No pain. Swelling under right scapula. Fluctuation obtainable.

Seventeen doses of tuberculin, .00013 mg. to .0013 mg., were given from Nov. 4, 1907 to March 2, 1908.

Present Condition, March 13, 1908. No increase in deformity. Spasm absent. Swelling under right scapula has decreased. General condition good.

Case XX.—Age, 4 years. Diagnosis, Pott's disease of cervical region. Duration unknown. Admitted April 24, 1903.

Condition on Admission. Slight deformity. Motion limited in all directions. In great pain. No paralysis. No abscess.

Condition at First Injection. All movements in upper cervical region very much limited. No pain. General condition good.

Tuberculin was administered from Nov. 4, 1907 to March 2, 1908, seventeen doses, varying from .00013 mg. to .0013 mg., being given.

Present Condition, March 13, 1908. No improvement in motion. No pain or spasm. General condition excellent. Weight increasing.

These six cases of Pott's disease all progressed favorably under the tuberculin. Some spasm was present in all at the time of beginning the injections and is now present in none.

Case XXI.—Age, 5 years. Diagnosis, knee-joint disease Duration, three and a half years. Admitted July 19, 1905.

Condition on Admission. Pain, moderate swelling and limp. Spasm subacute. Partial subluxation. General condition poor.

Condition at First Injection. Complains of no pain. Swelling slight. Subluxation almost overcome. Sensitiveness much reduced. About 10° of motion. Bier's treatment begun July 26, 1907.

Tuberculin was begun August 12, 1907. Twenty-four injections were given according to the previous method.

Present Condition, March 13, 1908. Bier's treatment has been applied daily since July 26, 1907. No pain, no swelling, subluxation overcome. Sensitiveness still present. Motion about 10°. General condition excellent.

Comparing the three examinations, a much greater improvement is seen in the seven months in which tuberculin was used, than in the previous twenty-five months. However, besides the vaccination, the patient received Bier's treatment. The joint is still very sensitive and motion has not increased.

Case XXII.—Age, 13 years. Diagnosis, knee-joint disease (right). Duration, 7 years. Admitted May 4, 1907.

Condition on Admission. Had a number of abscesses. Sinuses all closed. Patella ankylosed. Very slight motion, if any, in knee. Flexion to about a right angle. Complains of no pain. General condition fair.

Condition at First Injection. No further abscess. Slight movement in knee. Flexion about a right angle. No pain. General condition fair. Tuberculin given for diagnostic purposes with positive reaction. Bier's treatment begun July 16, 1907.

Tuberculin was begun July 26, 1907, twenty-five injections being given after the previous method.

Present Condition, March 17, 1908. Bier's method of treatment has been given each day since July 26, 1907. Flexion deformity not increased. All movements at knee very limited. No pain. General condition excellent.

Case XXIII.—Age, 11 years. Diagnosis, knee-joint disease (left). Duration, six years. Admitted July 19, 1905.

Condition on Admission. Joint flexed to 90°, very acutely sensitive and swollen. Subluxation of tibia marked. Atrophy marked. Bier's treatment applied for several months but discontinued as condition of joint did not seem so good. General condition good.

Condition at First Injection. Sensitiveness still present but greatly diminished. Deformity largely overcome. Slight motion in joint. Atrophy marked. General condition good.

Tuberculin was first administered December 16, 1907. Seventeen doses were given, as in Case IX.

Present Condition, March 17, 1908. Deformity not increased. Spasm not increased. Motion about the same as on first injection. General condition excellent. Gaining in weight.

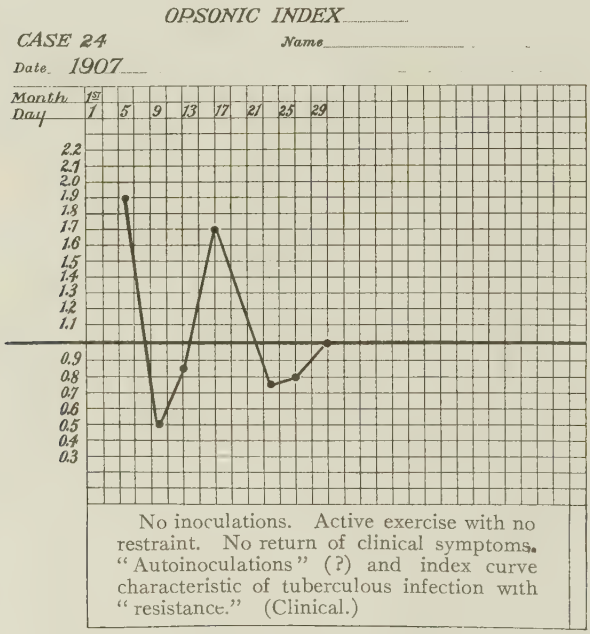
This case and the preceding one show very slight, if any, improvement in the arthritis, which can be attributed to the tuberculin treatment.

Case XXIV.—Age, 6 years. Diagnosis, hip-joint disease. Duration, over two years. Admitted December 2, 1904.

This patient did extremely well under hospital treatment and on December 1, 1906, orders were given that he be allowed to go a few hours each day without a brace. As there were no local symptoms indicating any harm, the time for going without the brace was gradually increased. Serum examinations were made to determine if the use of the joint excited any increase in the opsonic index, thereby indicating the activity of the disease. These in-

dications were ignored and the patient has shown no clinical evidence of an awakening of the lesion. It is now six months since he has received any orthopedic treatment.

The opsonic index charts of cases VII., X., XII, XVI, and XVIII. showed the occurrence of low indices with tuberculin inoculations, and in all of these there was marked clinical improvement. Twelve of these cases received eye-inoculations of tuberculin pre-



cipitate. Ten, who had been under treatment for three months or more, gave no reaction while in two tested before injections were begun, there was a conjunctival response.

The blood examinations were made with the object of finding out whether or not tuberculin could be administered more safely with than without following the opsonic index.

Incidentally the opsonic charts showed several other interesting facts. We began with the impression that Wright's statements in respect to low indices in tuberculous infections, were correct; but the charts showing marked variations, with patients at rest, in the

opsonic reading soon proved the impossibility of basing ideas and dosage on low opsonic indices. The charts (compare cases I and 3) show definitely two types: one, in which the index is markedly variable when compared with the slight variations noted for the controls (two non-tuberculous individuals), and a second type in which the index remains low for limited periods of time. The marked difference between the degrees of variation in the normal and tuberculous charts is good evidence for the conclusion that the latter recorded variations are due to tubercle bacillus toxines. The variations in the normal charts we supposed due to the relatively gross method employed for opsonic determinations. So we would conclude in respect to single index determinations that an index below 0.6 or above 1.3 is indicative of active tuberculosis. The relation of dosage to the opsonic index in this class of cases is not so simple a one as first noted by Wright in tuberculous individuals. From our charts the first type, with variable index chart, shows no reason for withholding tuberculin inoculations. The second type, with a persistently low index before treatment allows of and calls for tuberculin inoculations, but a series of low indices during inoculations calls for omission of inoculations for ten days or two weeks; and yet the opsonic index is not necessary as a guide to the omission of inoculations, since during this continued depression of the index the clinical symptoms as noted in a former paragraph are a good guide. We conclude that the opsonic determinations must be made at least twice a week at intervals of three or four days to be of any value and that one should make a series of observations, before inoculating, over a period of two weeks in order to establish the type of chart: and even then the second type, with persistently low index, may at any time change to the first type with variable index. When a patient is not doing well under inoculations, a series of low indices certainly calls for an omission of inoculations.

When the higher strength inoculations are used, the opsonic charts may be of service, since the patients seem to become immune to tuberculin—tuberculinization—so that larger doses are withstood without any marked improvement, and these may be followed after a variable period of time by a falling off from the

improved condition, with a possibility of a moderately low index. Such a chart, under high dosage, is an indication for a marked decrease in dosage. Since we have learned this by experience, and so do not increase dosage above .01 to 0.05 mg. instead of 0.1 to 0.5 mg. or even 1 mg. as in our earlier cases, it is no longer necessary to determine the index in order to establish the advisability of high doses.

It is true that individuals differ in respect to their ability to withstand doses of 0.1 to 1 mg. and even higher, but in our experience any case will ultimately utilize from 0.01 to 0.05 mg. as a high dose, and few cases are benefited by doses as high as 0.1 mg. even though they may become tuberculinized to a dose of 1 mg. and show no tuberculin reaction to such a dose.

In our later cases we attempted to work out the favorable dosage by determination of the index twenty-four hours before and twenty-four hours, forty-eight, seventy-two hours, and on the fourth, fifth, seventh and tenth days after a single dose. It may be seen from the charts (of cases III., VI., VIII., and IX.) that certain doses produce pronounced negative and positive variations of short and long durations, depending upon the dosage, and that thus we may apparently determine by this method a dosage which will maintain a high index for three to seven days, provided one is willing to admit the possibility of autoinoculations interfering with the opsonic curve. On this basis cases III., VI., VIII., and IX. were inoculated repeatedly with the same dose, one which produced a positive phase of five to seven days' duration, and it was found that after eight or ten inoculations the index did not respond so markedly as after the first few doses of the same strength. Again, therefore, the dose was increased and the same higher dose was repeated eight to ten times until a still higher dose was called for by the index determinations. There seemed to be a definite reaction of maximum good after the first few repeated doses with a falling off in the response to the eighth or tenth repetition of the dose.

At the same time nothing seemed to be gained therapeutically, for cases inoculated in this manner did not do so well as those inoculated with successively increasing doses to a maximum of

0.01–0.05 mg. As a rule, a second and a third course of inoculations are indicated.

The three methods of regulating the doses are illustrated in cases II., V. and XIV. Increasing the amounts to large doses is seen in the history of case II. In case V. the desired dose, after being reached by progressively increasing the amount, was constantly repeated. In case XIV. the increase was continued to moderate size doses.

Discrepancies and omissions will be noticed in some of the histories. Rather than correct them from memory, we ask your indulgence, for unconsciously we might make a misstatement of facts.

Temperature charts were kept of all these cases. They are not here reproduced as they throw absolutely no light upon the value of this treatment. The temperature curve in each case was such as would be expected from the course of the disease.

From our experience, we venture to draw the following conclusions as to the use of tuberculin in the treatment of tubercular arthritis.

Tuberculin is of decided value in the treatment of tubercular joints. It may be administered during any stage of the disease.

The initial dose should be from .0001 to .0002 mg. or ♏ 3 of a solution, 1 c.c. of which equals .000001 gm. The next dose may be ♏ 5, and so on up until .001 mg. or ♏ 1½ of a solution, 1 c.c. of which equals .00001 gm. is reached.

Until the dose of .001 mg. is given, the inoculations should be given every three or four days, twice a week. After that every five days, or once a week. When the dose has reached .01 mg. or ♏ 2 of a solution, 1 c.c. of which equals .0001 gm., the vaccinations should be made once in ten days and the greatest of care should be taken to guard against reactions. Larger doses are not advisable. The treatment should be interrupted for a month or two and the second series of inoculations should be begun with from .0001 to .0002 mg.

A slight local reaction, whether simply an erythematous condition of the skin or an indurated mass at the site of injections is of no consequence, but injection should be made elsewhere until the part is again normal.

The temperature should be taken every four hours, for forty-eight hours before and after each inoculation. A sudden or unusual rise in temperature had better be followed by a much reduced dosage or an omitted dosage.

Constitutional symptoms, such as nausea, chilly sensations and headache, occurring within forty-eight hours of a vaccination demand a cutting of the dosage by one-half, and a slower rate of progression.

The opsonic index is not to be used as a guide to the removal of mechanical apparatus.

Tuberculous individuals show variations in the indices which are more marked than in the normal individual. Inoculations are to be continued regardless of the indices; the clinical symptoms alone to be the guide. Tuberculin can be safely given without ascertaining a single opsonic index.

Tuberculin in these cases does not of itself act as a cure to be relied on solely. It is only to be classed as of assistance to both the local and the general constitutional treatment. While it seems to be the best tonic we have for these patients, all of them gaining in weight, in their blood constituents and general well being, it also has an effect on the local infection, which cannot we believe, be wholly accounted for by the improvement in the general health.

The encouraging interest in prosecuting this work continuously shown by Dr. Shaffer, was of great assistance and fully appreciated.

We would like to state here, also, that our thanks and those of any one who may find this paper of value, are due to the resident surgeon of the hospital, Dr. Howard D. Urquhart, for his willingness in helping with the undertaking.

NOTE.—The numbers referred to on pp. 65–68 denoted charts exhibited when the paper was presented. Lack of space had prevented inserting in this article copies of these charts.

VII.

A FURTHER REPORT ON THE TREATMENT OF JOINT TUBERCULOSIS WITH MARMOREK'S SERUM.*

BY ALBERT H. FREIBERG, M. D., CINCINNATI, O.

In the preliminary report on the use of Marmorek's serum, which I offered last year, the position was taken that a longer period of observation was necessary in order to justify a definite estimation of its value. It has always seemed to me that a large part of the clinical testimony offered in behalf of the various methods of treating surgical tuberculosis was not beyond the just criticism of prematurity. We have heard too much of immediate effects and too little of definitive results and it is possibly even somewhat pardonable if, in our great desire to see benefit accrue to those who suffer, we permit ourselves to be carried away from strictly scientific habits of judgment. It was with the intention of avoiding this error, however, that I resolved to report upon the course of the cases offered for your consideration last year, as well as to present such additional cases as I have been able to observe in this connection in the meanwhile.

Of the ten cases offered in the preliminary report, two deaths from generalization were recorded. These were offered simply as cases in which the serum failed to avert the fatal issue which was otherwise inevitable. This leaves eight cases to be accounted for and I beg leave to offer brief comment concerning these.

Case I.—A colored boy, 19 years old, whose hip had been resected three years before, with two discharging sinuses which healed after he had received 200 c.c. of serum per rectum. This boy has been under treatment twice since the report. The first time because of a tuberculous abscess in the right radius,

*Read before the American Orthopedic Association at its Twenty-second Annual Meeting, held at Chicago, June 4–6, 1908.

which was operated upon. He left the hospital with a sinus still discharging. No serum was used at this time. Four months later he was readmitted because of a fracture of the great trochanter of the resected hip from direct injury. The radial sinus had continued to discharge. A sinus reopened below the fractured trochanter. The radius was again operated upon, the Mosetig-Moorhof bone plug being used. Part of the plug was

CASE II.—Before Treatment.

extruded. The boy was discharged in three months with all sinuses closed. He has not been seen for five months.

CASE II.—Knee tuberculosis in a young woman, 22 years of age. Case in private practice. Disease of 18 months' standing. Focus in upper end of tibia at articular surface. Was reported as much improved. Apparatus was used conjointly. Has now had 300 c.c. of serum altogether. No tenderness or swelling

about the joint. Slight motion is permitted. X-ray shows evidence of repair in returning sharpness of contours. General health excellent. This case is regarded as cured.

Cases III. and IV.—Deaths above commented upon.

Case V.—Hip disease in a boy of six, of one year's duration. Had been rubbed by an osteopath. Remarkably good physique. Case in private practice with unusually good surroundings. Has

Case II.—After Treatment.

had 350 c.c of serum. Is not yet well. There is no evidence that the serum has had any influence. The treatment has been supplemented by the use of plaster spica and ischiatic crutch and I am unable to distinguish any difference in its course from that of the average case of like severity.

Case VI. Disease of the fifth lumbar vertebra in a woman of 27. Sinuses on both sides of pelvis. Under use of serum

(200 c.c.) both sinuses closed. Had gained 25 pounds in weight. Since last report had severe diphtheria with extensive paralysis following. The older sinus has reopened and is discharging, though not profusely. Has thus far had no further serum treatment.

Case VII.—Case of wrist disease with severe pulmonary involvement. Wrist was decidedly improved, but patient died after two months from pulmonary disease.

Case VIII.—Disease of first and second metatarsals, internal and middle cuneiform in girl of fourteen. Was still under treatment at time of report. After receiving 200 c.c. per rectum was allowed to go home, almost well. Appeared to have benefited greatly from serum, but has been lost sight of.

Case XI.—Mid-dorsal spondylitis in boy of ten, of two years' duration. Sinuses in both groins. Serum (200 c.c.) seemed to have no effect at time of report or since.

Case X.—Ankle disease in boy of 18, which had been operated upon and in which recurrence was taking place. Serum failed to prevent this and amputation was done.

I should thus summarize these ten cases:

Two deaths are to be regarded as inevitable and serum treatment was used simply as a last resort. This is really the view which should also be taken of case VIII. It seems evident that we have nothing to expect from the serum in generalized tuberculosis. Of the seven remaining cases four seem to have been greatly benefited and in three a cure may be spoken of. In two of these recurrence took place as the result of injury and other intercurrent disease respectively. It seems not impossible that prolonged treatment might have averted this. In three of the seven cases no improvement could be ascribed to the serum. One of these appeared to be of the most favorable kind and I can offer no explanation. The other two were unfavorable cases to begin with.

In addition to this first series of ten cases, I have used the serum during the past year in six cases only. Two of these have been under observation constantly during this time and seem worthy of special consideration. I shall first, however, make mention of one case which should properly be withdrawn from this number since but little serum was used and since it was of

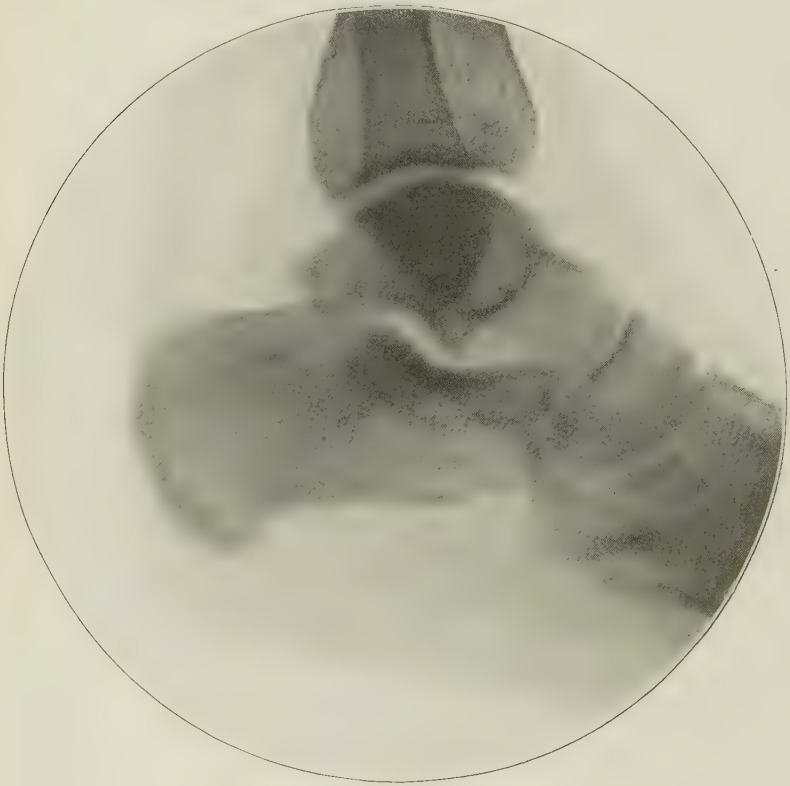
obviously desperate character. The patient was a woman of 36 with suppurative disease in both the lumbar and cervical regions of the spine, a large retropharyngeal abscess was present, the general condition was of the gravest character and the serum was used as a last resort. The patient succumbed before a second series of treatments could be given, and I feel that this case should on no account be used in any appraisal of the value of this remedy.

Case XII.—A boy, five years of age. Left hip disease of one year's standing. Upon admission there was marked deformity in abduction and flexion; the hip was quite sensitive and there were frequent night cries. Deformity was overcome in four weeks by weight and pulley, but the hip continued to be sensitive. A large abscess formed on the thigh and was aspirated. There was no mixed infection to be demonstrated. The abscess refilled promptly. Serum was now administered (April, 1907) and a plaster spica applied after aspiration of the abscess. The boy's general health improved at once; there were no further night cries and the abscess has not refilled. Two hundred cubic centimeters of serum in all were given. Prompt ankylosis of the joint seems to have occurred from this time. The joint is no longer sensitive at all. The spica is still being worn for the sake of safety.

Case XIII.—Ankle disease in a girl of 18; the father died of consumption. The disease was of three years' duration, but apparently of slow progression. The X-ray showed marked disease of the astragalus, particularly of its posterior process, and of the os calcis beneath. There was marked swelling of the ankle region. A plaster splint was applied and 1 hour's congestion by the rubber bandage daily was ordered. This was not followed by improvement. Eight weeks after beginning this treatment, abscess formation was evident on the lateral side of the tendo Achillis. This was aspirated and filled with iodoform emulsion. At the same time the administration of serum was begun: the first series was given by subcutaneous injection, the subsequent ones per rectum. This treatment was begun in November, 1907, and was supplemented by periarticular iodoform injections at intervals of two weeks. The patient has had 250 c.c. of serum. The ankle is now well, as shown by clinical and X-ray examination, although the bone atrophy is not yet recovered from. I am uncertain concerning the rôle which was played in this case by the iodoform injections. I can only say that, having used them often before, I have hitherto not seen any manifest result there-

from. I cannot help feeling that the serum contributed most largely to the recovery of this case.

Case XIV.—Tuberculosis of the left wrist in a man, 26 years of age. Development was rapid (6 months) and a large amount of fungus and effusion were present. X-ray failed to show any bony focus whatever. Bier's congestion failed to impede the steady disorganization of the joint. Serum was now given sub-



Case XIII.—Before Treatment.

cutaneously in doses of 10 c.c. every other day. Suppuration occurred, however, and total resection of the wrist had to be done in February, 1908. Suppuration is still present, but recovery is taking place. I have not been able to satisfy myself of any influence whatever from the serum in this case.

Case XV.—Left hip disease in a boy of six years, of 18 months' duration. Admitted January 13th, 1908, with marked deformity in flexion and abduction. Joint very sensitive. An abscess had

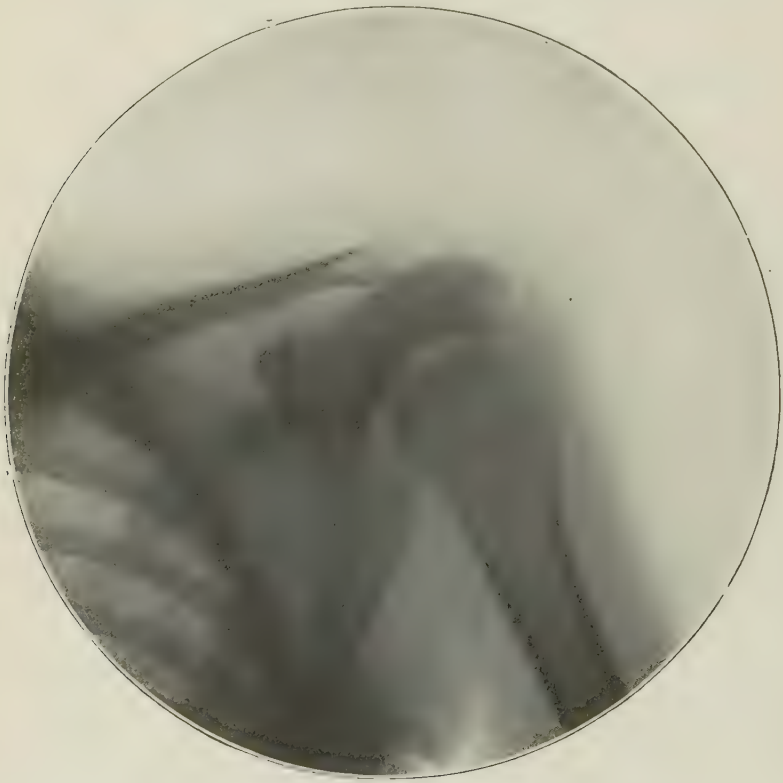
been opened in the fold of buttock three months before by a general practitioner, and was discharging profusely. Very frequent night cries. Weight and pulley traction. The deformity was easily overcome, but sensitiveness continued. February 12, 1908, serum treatment was begun, 10 c.c. being given per rectum every day. Marked improvement was soon manifest, but the boy had now to be withdrawn from the ward on account of

Case XIII.—After Treatment.

measles. Upon his return was quite emaciated and the sinus again discharging profusely. Was now given 100 c.c. of serum in daily doses of 10 c.c. Promptly improved, gaining markedly in weight; the discharge from the sinus has almost entirely stopped and the boy is entirely comfortable in a plaster spica. The last serum was given on April 23, 1908. This note is made on May 13, 1908. The consequence of the intercurrence of measles in this case is so greatly at variance with

what I have before observed that it seems to me to be worthy of emphasis in connection with the use of the serum.

CASE XVI is the most remarkable of the series, to me at least. I examined this patient for the first time on April 17, 1907. He was a boy 12 years old who had suffered pain in his right shoulder for over three years. The pain was most severe in the mornings, diminishing as the day proceeded. The right arm

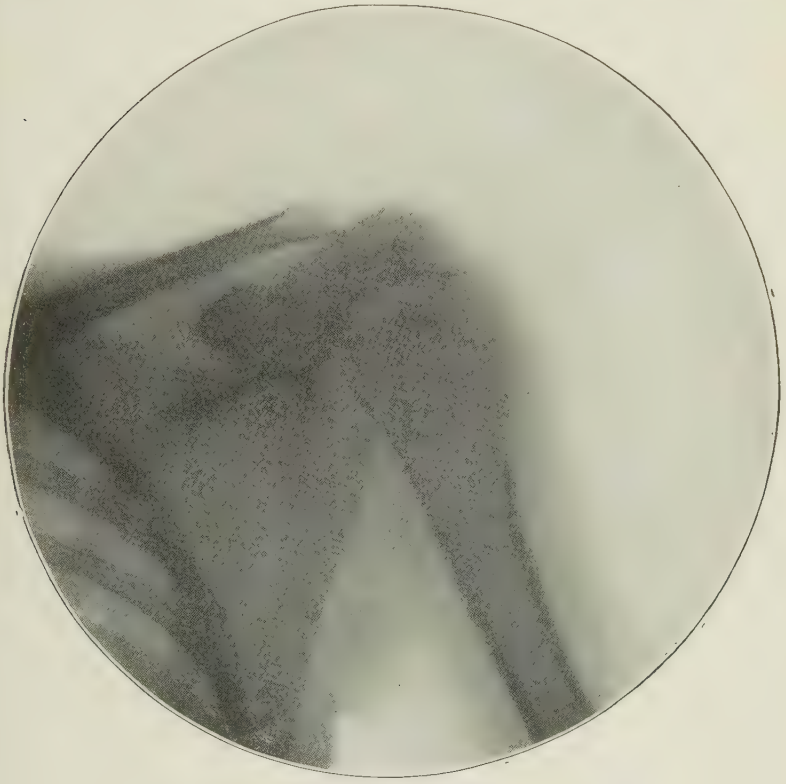


CASE XVI.—Before Treatment.

has been very weak so that he has become a left-hander. The parents are both healthy, but there is a history of tuberculosis in the mother's family. The boy has been otherwise perfectly well. His shoulder was examined at different times by physicians, all of whom considered the trouble rheumatic. Treatment directed to this end was without effect.

Examination showed a well developed but poorly nourished boy. Instead of swelling of the right shoulder, marked atrophy of

the detoid and of the humeral head is apparent. The head of the humerus seems not half as large as that of the left side. The joint is very tender to pressure at all accessible points and especially from the axillary side. Marked limitation of movement in every direction, but especially in upward extension and external rotation. Great muscular atrophy in arm and forearm.



CASE XVI.—After Treatment.

The extremity is $\frac{3}{4}$ inch shorter than its fellow, measured from the tip of the acromion.

The radiogram taken at this time shows a marked loss of substance in the head of the humerus. There is some erosion of the glenoid fossa. Marked bone atrophy of the upper end of the humerus. Diagnosis: Caries sicca.

Treatment was begun April 23, 1907, and has consisted solely of Marmorek's serum given per rectum in doses of 10 c.c. and afterward of 5.0 c.c. and of the use of a leather strap as

a sling for the forearm, together with general hygienic measures. The patient's home surroundings have, however, been of the very best throughout his life. Altogether 350 c.c. of serum have been used in this case. Within eight weeks from the beginning of this treatment, spontaneous pain had entirely gone; local tenderness required an additional four weeks for its disappearance. From this time on, the joint had been entirely painless. Joint motion has returned to a great extent, but some restriction can still be noted in upward extension and external rotation. The arm has grown much stronger. Radiograms were made at frequent intervals during the year of observation and have shown a change of much more gradual character than the clinical course. The last radiogram shows a marked change when compared with the first. The bone contours have become sharp again, the bone structure has become definite and clear as contrasted with the haziness of the first radiogram.

It should be added that this patient has received no serum during that last six months.

I approach the concluding comment on these cases with the same diffidence as before. Self-deception is very easy with so limited a series of observations; the great expense attending the importation of the serum, which has thus far been produced in France only, has precluded my extending greatly the limit of my experience with it. I feel, however, that I must nevertheless express myself as convinced that in some cases of bone and joint tuberculosis, Marmorek's serum must be credited with a definite curative value. I believe this, uninfluenced by the fact that it has been without effect in some apparently favorable cases and that in desperate cases and as a last resort it has seemed to lend no aid whatever.

On the basis of personal observation I am in no position to draw comparison of this method with that by means of tuberculin, either with or without the control of the opsonic index. I must simply say that it seems to me highly important that Marmorek's serum should receive wider attention in this country and that it should receive further and unbiased trial. It would seem to be entitled to this by reason of the abundant clinical evidence which has thus far been offered and the promise thereby given of so important an addition to our therapeutic resources.

VIII.

BLASTOMYCOSIS: REPORT OF TWO CASES RESEMBLING BONE TUBERCULOSIS.*

BY EDWIN W. RYERSON, M. D., CHICAGO, ILL.

Blastomycosis has ordinarily not been considered a factor in orthopedic surgery. It has received much attention from the dermatologists during the last few years, chiefly through the work of Hyde and Montgomery, and a few cases of systemic blastomycosis have been reported in addition to the large number of cutaneous cases.

In 1905, Eisendrath and Ormsby reported one in which, late in the course of the disease, a kyphosis was noticed, but the diagnosis had been clear long before the deformity made its appearance.

Dr. Stober, pathologist to Cook County Hospital, has stated to me personally that several systemic cases observed by him have showed evidences of vertebral involvement.

It is generally recognized that the early symptoms of the systemic form resemble closely those of tuberculosis.

During the past year two cases occurred on my service at Cook County Hospital which were so unusual and confusing that it seems worth while to bring them to your attention.

Case I.—C. F. S., a young man of twenty, American by birth, entered the hospital on May 8, 1907, and was assigned to the orthopedic service as a case of tuberculosis of the knee and ankle.

Since the early winter he had suffered somewhat from dyspnea, pain in the chest and occasional night-sweats. In December, a small pimple appeared on his left side, which gradually increased in size and became ulcerated. Similar pimples soon occurred on the chin and over the left eye, and became ulcerated. These were believed to be tuberculous, and a physician had treated them as lupus. During the winter, cough and bloody

*Read before the American Orthopedic Association at the Twenty-second Annual Meeting, held at Chicago, June 4–6, 1908.

expectoration were noticed. The left knee became swollen, painful and flexed, and motion was restricted. In February or March, the right outer malleolus became swollen and tender.

His family history and previous personal history were unimportant, except that he had slept for some months in the damp cabin of a dredging-boat.

On examination he was found to be poorly developed and nourished and anemic. The right lung showed dullness and râles in the upper lobe. The temperature was 100. There were crusted lesions on the face in the sites before mentioned. There was a soft, fluctuating swelling over the left side of the neck. The left knee was swollen, not fluctuant, not tender, flexed five or six degrees, motion in flexion to a right angle only, and motion somewhat painful. The right outer malleolus was extremely tender and painful, swollen and fluctuating. On May 10, the right ankle was operated upon for the relief of the severe pain. An incision into the swelling evacuated half an ounce of pus and a small opening was found leading through the periosteum into the epihysis of the fibula. This opening was enlarged, a cavity half a centimeter deep was curetted and swabbed with tincture of iodine, and the wound closed without drainage. It had the appearance of an ordinary tuberculous process. The abscess in the neck was curetted, and the supposed lupous ulcer on the chin was excised. The wounds healed by first intention and gave no further trouble until four months later, when the malleolus again became swollen and later discharged pus spontaneously.

A few days after the operation a swelling appeared in front of the ear, soft, painless and fluctuant. It reached the size of an English walnut, and was evidently caused by a stoppage of Steno's duct, with retention of the saliva. This was aspirated, but soon refilled, and later became infected and was opened. This parotid occlusion was also noted in the second case to be reported.

Severe pain now appeared in both ankles and one wrist, and Bier's hyperemic treatment was used, without any appreciable benefit. Abscesses soon appeared on the right forearm and left tibia, and pus was aspirated from the tibial abscess and examined microscopically. Many blastomycetes were demonstrated, establishing for the first time the correct diagnosis.

Up to this time I had considered the case one of general tuberculosis, and had ordered no especial medication. From now on, however, potassium iodide and mercury were given. A month later, these were discontinued, and a quarter of a grain of copper sulphate was given three times a day.

During the next two months the course was progressively downward, and marked by continuous and severe pain and great emaciation. Many new abscesses appeared on the head, chest, back, both knees, ankles, feet and both elbows. The man died on September 17, 1907, having been delirious for several days.

The autopsy showed general blastomycosis, the lesions of the joints being apparently secondary to epiphyseal infections, which in the case of the femurs were strongly suggestive of infarcts.

Case II.—J. C., an Italian boy, 21 years of age, was referred to me through the Tuberculosis Institute.

His family history and previous history were unimportant. Since November, 1906, he had had a cough with some bloody expectoration. On December 1, he noticed pain in the back of the neck and the right side of the chest. From this time on he was practically unable to work, and he stayed in bed most of the time for five months. On May 30, he fell from a fence and hurt his back, and at once became unable to control his urine and feces. On July 1, he went to the infirmary at Dunning and stayed for a month in the tuberculous ward.

In August he was brought to my office for the first time, complaining of cough, pain in the back, weakness of the legs, and involuntary evacuations. His back showed a moderate and rounded kyphos in the upper dorsal region, involving the first four dorsal vertebræ. The gait was spastic, the knee-jerks increased, and there was slight ankle clonus. There were gross evidences of lung involvement, which I considered to be undoubtedly tuberculous.

I referred him to the Cook County Hospital, and he entered my service in August, 1907. He was put to bed, with traction upon the head, and the head of the bed elevated. After a week of this treatment he rebelled, saying that his cough made it impossible to endure the restraint of the traction. He then sat up in a wheel-chair and walked a little with crutches. Three weeks after he entered the hospital the paralysis increased so that he became unable to walk, and a month later there was complete paraplegia. Sensation was much diminished, but never completely lost. Babinski's sign was present. Up to this time no skin lesions had been noticed, but now, about October 17, a small abscess appeared on the left cheek near the nose, and soon opened and discharged. The parotid gland on the right side then became swollen and cystic, and later discharged pus.

A subcutaneous inoculation with tuberculin on November 14 gave no reaction.

By December 1 a large abscess had appeared at the base

of the neck, and the cervical glands were much enlarged. Several small painless irregularities were found on the ribs. The lungs were much more involved than when first seen. The liver and spleen were palpable. On the back and on the shoulder were large flat abscesses. The knee-jerks had now become very weak, and the Babinski sign had disappeared. The legs were completely paralyzed. The abdominal and cremasteric reflexes were present, and more marked on the right side. The pain and tactile senses were much diminished, and the heat and cold sense was lost.

The sputum was now examined, and showed enormous numbers of blastomycetes. An ophthalmo-tuberculin test, made on January 23, 1908, gave a positive reaction, which may have been due to the tuberculin injected ten weeks before.

The course of the disease was steadily downward, although some of the symptoms were much improved and there were periods when the patient's general condition was definitely better. In November, the cough, which was at first very troublesome and painful, ceased to be annoying. The sputum, which had been profuse and blood-stained, became much lessened in amount, and the blood disappeared.

During January, a small amount of voluntary motion appeared in the legs. The abscess over the lumbar spine disappeared entirely, but the one at the base of the neck became larger, the kyphos grew more pronounced, and slight crepitation could be made out over the seventh cervical vertebra. The left knee, which had been giving little trouble for some months, now became painful and fluctuating, and soon the other knee and both ankles also suppurated. These abscesses ruptured externally and formed discharging sinuses. They were curetted, in two or three instances, and swabbed out with iodine, but the operations seemed only to increase the discharge and the pain. These joint lesions were exceedingly painful, especially during the last month of life.

The temperature was practically normal most of the time, but the pulse was rather rapid. The man was simply a mass of suppurating ulcers and sinuses for months before his death, and it seemed extraordinary that he could live so long in his desperate condition. He died March 14, 1908, after having been in the hospital for seven months. The disease had apparently been in progress for about sixteen months. The drug treatment was limited to potassium iodide, copper sulphate and simple iron tonics, none of which seemed to have the slightest good effect.

Autopsy was not allowed in full, and only a small incision was

made in the thorax. The bodies of the vertebræ involved in the kyphosis were carefully palpated by Dr. Stober, the resident pathologist of the hospital. He was unable to feel any destruction of the anterior surface of the spine, but the front of the second dorsal vertebra was covered with a cicatricial mass involving the pleura. This vertebra was removed with bone-forceps, and a small portion of the cord was exposed, but no gross changes were noticed. It is greatly to be regretted that a complete autopsy could not be obtained.

I can offer but few excuses for having failed to make the diagnosis in these cases. Up to this time I had considered blastomycosis as a cutaneous disease, and had, in fact, no knowledge of it whatever as a systemic disease resembling tuberculosis.

The skin lesions in the first case should certainly have been investigated more thoroughly, and the aid of the dermatologists on the staff should have been invoked, but in the second case no skin lesions at all appeared until the patient had been under treatment for several months for his lung and spinal troubles. The joint symptoms in both cases seemed compatible with a tuberculous infection. The history does not seem to me to be of great diagnostic value, since it so closely resembles that of pulmonary tuberculosis in the earlier stages, and it is probable that the diagnosis in similar cases will continue to be made by the microscope after suspicion has been aroused by the skin lesions, in most of the cases at least.

Much fuller reports of these cases and the detailed pathological examinations will shortly be published in the Bulletin of the Cook County Hospital by Dr. A. M. Stober, the resident pathologist, together with his very ingenious and plausible theory of the causation of the disease. To Dr. Stober is due the credit of making the diagnosis in these cases, and to him and to Drs. Myers and Boughton, the internes in charge, I am indebted for the use of their notes in the preparation of this paper.

IX.

THE CAUSE OF ATROPHY IN JOINT DISEASE.*

BY ARTHUR T. LEGG, M. D., BOSTON, MASS.

Although much has been written on the subject of the cause of atrophy seen in joint disease, and as yet no theory is generally accepted as conclusively proving its cause, it is my intention to offer the results of some animal experiments performed by me in the Surgical Research Laboratory of the Harvard Medical School with the idea of comparing the amount of atrophy caused by joint disease with that of disuse, believing that the reasoning of most writers on the subject has been more theoretical than practical.

The theory most commonly accepted to explain the atrophy from joint disease is the "nervous reflex theory" advanced by Vulpian, whereby the terminal ends of certain sensory nerves of the joint, being irritated, produce a change in the gray matter of the cord, causing the trophic changes seen in the limb. John Hunter, in 1776, called the atrophy seen in joint disease a sympathetic atrophy. In this is found the germ of the idea of the reflex theory. Charcot advanced practically the same theory, but went further in assuming the presence of trophic nerves in the cord which, irritated by the joint lesion, control the nutrition of the limb.

In support of these theories many experiments have been carried out, most important of which are those of Voltat[1] and of Cazin and Duplay.[2] In their experiments, irritating substances, such as red pepper and mustard oil, were injected into the joints and the amount of atrophy observed. Their results illustrate the well-known clinical fact that atrophy occurs in acute joint disease, but as no control animals were used it cannot be claimed that they do more.

Curling,[3] Ollier[4] and Humphry[5] speak of inactivity as being of importance in the causation of atrophy seen in bone diseases and in amputation stumps, but do not accept its being the entire cause.

*Candidate's Thesis: Read before the American Orthopedic Association at its Twenty-second Annual Meeting, held at Chicago, June 4–6, 1908.

Boeckel,[6] in a paper concerning the effects of hip-joint disease in causing atrophy of the lower leg, concludes that "the arrest of growth is proportionate to functional inactivity and atrophy of muscles."

Sabourin[7] introduced a novel theory to account for the atrophies which accompany arthritis, particularly those which are seen about the shoulder in the deltoid, according to which it was due to irritation of the periarticular fibrous tissue.

In 1876, Sir James Paget[8] speaking of the wasting of limbs near affected joints said: "This wasting occurs quickly in nearly all acute inflammations of joints; more slowly in the chronic inflammations. In the chronic, it may be from disuse alone; in the acute, it is not so, for it is much more rapid and extensive than in cases of mere disease. . . . It seems dependent on disordered nervous influence and often appears proportionate to the coincident pain as if it were due to the disturbance of some nutritive nervous centre, irritated by the painful state of sensitive nerve-fibres."

Lorenz,[9] in 1904, although admitting that inactivity plays a large part in the causation of muscle atrophy from joint disease, claims it is not the only factor.

Within the last year, Sudeck[10] claims a reflex atrophic cause as most important, in that muscles after atrophy from joint disease do not completely regain their normal size, which is not so when from disuse alone.

Not until Brackett,[11] in 1890 (in a paper before the American Orthopedic Association), has anyone claimed that functional inactivity may alone account for the atrophy seen in joint disease. His study is wholly from a clinical stand-point, but goes far to prove that functional inactivity plays a great, if not the entire, part in explaining atrophy from joint disease.

It is thus seen from the literature that although atrophy, as seen in amputation stumps and fractures, is admitted to be caused in part, at any rate, by inactivity, all writers, except Brackett, hold that inactivity cannot alone account for the atrophy seen in joint disease.

Experiments.—The results of the experiments to be reported were performed under three classes of conditions:

CLASS I.—Where the joint was simply infected and the rabbits allowed to use the affected leg.

CLASS II.—Where the joint was infected and immobilized.

CLASS III.—Where the joint was immobilized but not infected.

It is seen that under three such conditions we have one factor common in two classes, namely, infection in classes I and II and immobilization in classes II and III.

Male rabbits of about the same age and the left knee-joints were used in all cases. Three rabbits in each case were used.

A bouillon suspension of a pure culture of human tubercle bacilli was used to infect the joints. One cubic centimeter being injected into the knee-joint.

Immobilization was obtained by applying adhesive plaster from the ankle to the groin after all hair had been removed. Over the plaster a right-angle tin splint was applied by more adhesive plaster, and to prevent slipping of the splint it was held by a band running to a swathe just above the pelvis.

The rabbits were killed after a lapse of forty-two days.

Sections of the rectus femoris muscle were made midway between the pelvis and the knee-joint. Sections of the femoral artery were made as it leaves the pelvis and sections of the femur 2 cm. above the knee-joint.

Sections of the right leg as well as of the affected side were made to use as controls. In computing the amount of muscle atrophy, three hundred muscle fibres were measured in cross section in each case and the average taken.

In the case of the femur the average thickness of the cortex as well as the average diameter of the whole bone was used and of the artery the average diameter was used.

The amount of atrophy figured by percent. is as follows:

CLASS I.—*Left knee-joint infected. Not immobilized.*

Atrophy of:—

A. I.	
Muscle (diameter of fibres)	6.12%
Artery (diameter)	3.02%
Femur (diameter)	.5%
(cortex)	.48%

A. II.

Muscle (diameter of fibres)	5.82%
Artery (diameter)	2.6%
Femur (diameter)	.59%
(cortex)	.61%

A. III.

Muscle (diameter of fibres)	9.65%
Artery (diameter)	3.75%
Femur (diameter)	1.12%
(cortex)	1.05%

CLASS II.—*Left knee-joint infected and immobilized.*

Average atrophy of three rabbits.

Muscle (diameter of fibres)	12.18%
Artery (diameter)	4.36%
Femur (diameter)	1.51%
(cortex)	1.61%

CLASS III.—*Left knee-joint immobilized. Not infected.*

Average atrophy of three rabbits.

Muscle (diameter of fibres)	12.01%
Artery (diameter)	4.57%
Femur (diameter)	1.59%
(cortex)	1.64%

It should be mentioned in regard to Class I, in which the rabbits were simply infected, that rabbits No. I and II used the left leg until killed. Rabbit No. III, however, did not use the left leg for two weeks before being killed.

From these observations, it is seen that the atrophy of muscle, artery and bone from disuse (Class III) alone was as great as when the joints were infected and immobilized (Class II); and that the atrophy produced by injection and immobilization and that from immobilization alone was greater than when the joint was infected and the animal allowed to use the leg.

Thus there is a general atrophy from disuse in no way dissimilar from that caused by infection and immobilization.

A clinical comparison of atrophy from joint disease and that caused by functional inactivity is made with difficulty as the amount of disuse and the length of time it has been present varies in all cases.

The measurements of one hundred cases of hip-joint disease seen for the first time in the Out-patient Department of the Children's Hospital is of interest. These cases, having walked with limp on an average of seven weeks, showed an average atrophy of the thigh of $\frac{7}{16}$ inch and of the calf of $\frac{3}{16}$ inch. Thirty cases of functional joint diseases and of contusions causing limp showed an equal amount where the duration of limp was the same.

There is a class, however, of cases of joint disease in which very marked atrophy is seen even without immobilization by splints. I have found in all cases of this sort a marked thickening or abscess formation anterior to the joint where pressure on the femoral artery, shutting off to a large extent the circulation to the leg, can easily account for the extreme atrophy.

As did Brackett, I have found the amount of pain to have no relation to the amount of atrophy. To determine the actual amount of atrophy taking place normally by rest in bed, a series of fifty measurements were made in the wards of the Children's Hospital upon limbs not affected with joint disease. The normal thigh and calf were measured when the child entered and again before it was allowed to walk. With an average of two weeks in bed the thigh showed an atrophy of $\frac{11}{16}$ inch and the calf $\frac{3}{8}$ inch.

That this atrophy begins immediately is evidenced by the fact that in all cases appreciable atrophy was seen within forty-eight hours. Thus it is seen from a clinical stand-point that no more atrophy is present in joint disease without immobilization by apparatus than is seen in cases with limitation of motion without joint involvement.

Let us consider the normal physiology of the phenomena which take place in tissues with rest and functional activity.

Under normal circumstances every part of the body received exactly as much blood as it has need of and that by dilatation of vessels a particular part received more blood the more active it is, and by constriction a particular part receives less blood the less active it is.[12] A resting muscle for instance has a relative small supply of blood, but during activity the quantity increases owing to the widening of the blood-stream produced by the vasodilators.

This diminished or increased blood-supply causes respectively the atrophy or growth of a part. Bones as well as soft parts waste or increase in size according to their functional activity.

Thus the vasomotor system controls the blood supply to all tissues, increasing it the more active the part is, causing growth; diminishing it the less active the part is, causing atrophy.

In that the vasomotor centres controlling a certain part must receive a stimulus to cause a constriction or dilatation of the vessels to that part, this phenomenon must, of course, be reflex. That any nerve, however, directly modifies the nutrition of a tissue independently of inducing vascular changes in it or influencing those particular metamorphoses of material for which the tissue is the machine specifically adapted, there is no proof.[13]

Besides the general atrophy of a limb, there may occur a spontaneous atrophy of one or more muscles which cannot be explained.

Besides, also, the general atrophy which takes place in the bone, there are undoubtedly local changes—in some cases atrophy, in others hypertrophy—which occur about a seat of infection. Of the cause of these I shall say nothing.

Thus from these experiments and clinically it is seen that atrophy from functional inactivity alone is as great as that which occurs when the joint is infected and immobilization, while infected joints produce less atrophy than immobilization alone, if these joints are more or less active.

That atrophy occurs more rapidly the more acute the infection of a joint is certainly true, for here the spasm being more marked much less motion is allowed, where in mild infection motion is only slightly restricted by the spasm.

Atrophy from disuse or functional inactivity is explained by the control of the circulation by the vasomotor system. For this reason it is the writer's belief that the amount of atrophy seen in joint disease is wholly proportionate to the functional inactivity as is seen in the first class of experiments, and that the cause of atrophy as seen in joint disease is due to functional inactivity alone, this being brought about by the control of nutrition by the vasomotor system.

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X.

THE NECESSITY FOR EARLY ORTHOPEDIC TREATMENT IN POLIOMYELITIS.*

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The prevention of deformity has always been considered by orthopedic surgeons as of the utmost importance, but, unfortunately, in most diseases they have been able to accomplish but little in a practical way, as they have rarely been permitted to see cases until after the deformity had occurred. This statement applies with particular force to the deformities following poliomyelitis. That such deformities occurred with great regularity unless steps were taken to prevent their occurrence has always been taught by those interested in orthopedics, but it is only within very recent times that the general practitioner and the family have recognized the value of early orthopedic treatment, and this recognition is not, as yet, as universal as it should be.

The recent epidemic of this disease in and around New York, probably the largest in numbers ever known, has presented the opportunity for a study of these cases from the onset and has enabled those connected with the Hospital for Ruptured and Crippled in both the Neurological and Orthopedic Departments, not only to learn much, but to accomplish much, in the proper treatment of the disease and the prevention of deformities.

The usual method of treating cases of poliomyelitis has been to use electricity, either faradism or galvanism, massage, subcutaneous injections of strychnia and other tonics, and to encourage the patient by active and passive motions to use the affected parts as soon as possible. When deformities occurred, the patient was sent to a surgeon for the correction of the same. In many of the milder cases no diagnosis was ever made, and the first intimation

* Read before the American Orthopedic Association at its Twenty-second Annual Meeting, held at Chicago, June 4–6, 1908.

of the fact that there was a paralysis of certain muscles was when deformity occurred. In many the initial symptoms were so slight or so misleading that it was easy to see how the condition had been overlooked, but in many others the failure to make a correct diagnosis was either due to a careless examination or to ignorance.

It has been the writer's privilege to examine, during the eight months ending April 1, 1908, over 300 cases of poliomyelitis all of which had been stricken with the disease after July 1, 1907. Patients suffering from deformities due to attacks prior to this date were not included in this analysis. This number is largely in excess of the average number seen in similar periods during previous years.

*The following figures, taken from the History Books of the Hospital for Ruptured and Crippled show practically ten times as many cases in 1907 as in 1906:

June,	1906,	4	June,	1907	17
July,	"	3	July,	"	24
August,	"	7	August,	"	86
September,	"	11	September,	"	138
October,	"	14	October,	"	122
		39			387

The first fact of importance noted was the large number applying during the early stages of the disease, and the opportunity was thus afforded of directing treatment from the beginning. The plan followed was to advise complete rest until all symptoms of hyperesthesia and of the weakness following the attack had passed. Efforts to induce the child to move or to use the affected part were discouraged, and it must be here noted that such advice was not always carried out, as it was difficult to make many realize that violent and active measures to restore paralyzed limbs to the normal were not beneficial. The fact that atrophy, or wasting of muscle, followed the paralysis was a fact very gener-

*"The Recent Epidemic of Poliomyelitis" V. P. Gibney and Charlton Wallace, *Journal of the American Medical Association*, Vol. XLIX, No. 25, Dec. 21, 1907. For further data on epidemics, see article by Drs. Holt and Bartlett, *American Journal Medical Sciences* for May, 1908, and by Drs. Collins and Romeiser, *Journal of the American Medical Association*, May 30, 1908.

ally known, and rest was considered by many actually harmful. To do nothing but keep a paralyzed muscle quiet, to prevent overstretching or to maintain a proper balance between the paralyzed and the non-paralyzed tissues did not conform to the ideas given by many physicians to the parents or to the ideas that they held. Doing nothing is not a popular form of treatment for any condition, and many patients who were only seen once, and who did not return, were undoubtedly influenced to seek other advice by the method of treatment which was proposed. Many parents stated to the writer very frankly that they did not believe the proper way to regain the lost power was to keep the limb quiet, and that this was beneficial was a most difficult matter to impress on them. That the cases so treated have done far better than others, however, is the firm belief of the writer. Warm dressings, cotton, extra stockings or coverings to the affected part were advised, and many of the limbs from the start enveloped in plaster-of-Paris dressings to maintain complete rest and prevent motion. Later, electricity, both faradic and galvanic current, was employed, preference being given to the galvanic, although in the clinic faradism was most employed. Massage, salt baths, and very gradual return to use of the portion suffering from loss of power, were next employed, and in every instance, as soon as it could be clearly made out that the paralysis of any muscle or group of muscles would, if not treated by orthopedic measures, result sooner or later in a deformity, suitable apparatus was applied. In many patients, during the first few days or even weeks of the attack, it is impossible to say how much recovery will take place in any given group of muscles; such cases must be kept in bed or placed upon a frame or kept in a recumbent position on a properly constructed carriage or wheeled chair. Recovery is hastened thereby, as unaffected parts are not damaged, and the least possible strain is placed upon the parts affected. The use of electricity for diagnostic or therapeutic purposes in the early stages, especially in young children, is not advisable. The exact value of electricity has not been definitely decided, but as it often causes great pain and a dislike for any of the subsequent therapeutic measures we may desire to employ in the young children, it was

but little used. With the gradual or rapid recovery of certain parts of the body, in most instances it was clearly seen that one limb, generally a lower extremity, was left with the power of one or more muscles destroyed. At this juncture most careful examination was made, because of the liability to overlook the least prominent part affected. The parents of many children would declare that only the right lower extremity was affected, but upon careful examination the left would be found to be equally affected or only partly so. In the same way paralysis of muscles of the upper extremity were often found to exist without the fact having been recognized by the parent or the family practitioner. This failure to recognize other deformities than the most marked, or to make light of their importance, is frequently a serious matter, as deformities are allowed to occur that should have been prevented.

The subsequent development of deformities due to undue strain or weight upon parts but slightly affected, must also be kept in mind and guarded against. This is very frequently seen in the production of a valgus in one foot where on the opposite side we may have a more or less complete flail-foot or a definite deformity. In the foot least affected there may be a slight loss of power in the tibialis anticus which is not at first noted, although the foot may have been examined and the flexion and extension be apparently perfect, yet the extra strain sooner or later produces a flat-foot. Extra strain may also cause deformities in the unaffected limb when paralysis exists, and one must always be on the lookout for such occurrences. It is also important to prevent deformities that are of parts distant from the one most affected, yet which will invariably occur under certain conditions, such as a genu recurvatum following an equinus, a hip deformity after a paralysis of the lower limb, although the hip or thigh muscles may not be affected and a lateral curvature due to a tilted pelvis or short lower extremity. Other conditions may occur, but these are the most frequent.

Although all recognize that deformities frequently follow poliomyelitis, yet it is a fact that but few realize how rapidly they come on, and how frequently they occur. Let these facts once be thoroughly appreciated, and the value and necessity of early

orthopedic treatment will be apparent to all, and once this treatment is thoroughly carried out from the beginning, we should secure better results. In many instances where the initial paralysis is slight, in the sense that only one or two muscles of an extremity are paralyzed, as in cases of paralysis of the peroneals, many physicians really encourage the formation of deformities by urging exercises of the unaffected muscles, which tends to increase the lack of balance of the various muscle groups. The other muscles may or may not be affected, but if they are unduly stimulated a simple weakness may be transformed into a marked varus deformity. To simply encourage the action of the tibialis anticus, for instance, without regard to the position of the foot during such action, is a most faulty method of treatment. The muscles must be taught to act in the proper and normal anatomical lines. All stretching of the affected muscles must be avoided. As complete relaxation as possible is desirable and this also is of great assistance in preventing undue contraction of the nonaffected or healthy muscle.

Apparatus has been ordered during the eight months preceding April 1 on the Monday, Wednesday and Friday clinic of the Out-patient Department of the Hospital for Ruptured and Crippled, New York City, for sixty-six patients, all children, for the prevention of the following deformities:

Sex:	Male,	38	
	Female,	28	
			Total, 66.
Age:	Under 2,	25	
	Between 2 and 4,	24	
	Over 4,	8	
			Total, 57
	Not stated (all children),		9

Time between attack and occurrence of deformity:

2 days—1 case genu recurvatum.
1 week—1 case genu recurvatum.
2 days—1 case calcaneo-valgus.

Average time after attack when apparatus was applied, 3 months. Temporary apparatus when possible applied earlier.

Character of deformity:

Drop foot,	6
Genu recurvatum,	25
Talipes varus,	3
Talipes eq. varus,	3
Talipes valgus,	9
Talipes, calcaneus	7
Talipes calcaneo-valgus,	2
Talipes equinus,	14
Lateral curvature,	2
Drop wrist, etc.,	1
Weakness abdominal muscles,	3
Right valgus, Left calcaneus,	1
Right drop foot, Left valgus,	1
Multiple deformities,	3

By deformities in this list are meant actual deformity, as a genu recurvatum, varus, etc., or a condition that would sooner or later produce a real deformity, an actual paralysis, and inability to maintain the normal position. Under this head are included the patients with drop-foot. In all of these it was only a question of time when the heel cord would contract and produce an equinus or an equino-varus or valgus. In no instance was any permanent deformity allowed to occur. Slight deformities that had already occurred were corrected at once. In many, the apparatus was ordered at the first visit, in others at later periods, and in several patients where drop-foot was recognized before apparatus could be applied, the heel cord had become tense and shortened to a slight degree. The cases of calcaneus were necessarily very slight, as is always the case in the beginning of this condition, but where this diagnosis was made there was a complete paralysis of the posterior muscles, but heel cord lengthening was not allowed to occur, and some of these might be considered with equal propriety as cases of paralysis of the posterior muscles without deformity.

During the period that these patients were presenting themselves for treatment, three cases were also seen of the same epidemic where deformities had occurred that required anesthesia

before they could be overcome. In one, the thigh group needed stretching, and in one case of equinus a tenotomy was necessary. These are not included in this list. The statements of the parents as to when a paralysis occurred after the original attack were found to be very unreliable, but it is believed that in the three of the earliest cases recorded, the information was absolutely reliable. In cases where opportunity was afforded of watching the case from the onset, the average period when deformity occurred or could positively be predicted was from one to two months after the acute attack.

The large number of cases of primary genu recurvatum shows that in many of the cases examined there was a loss of power in the quadriceps femoris, or anterior thigh muscle group; in many of these there was a calcaneus present, showing clearly that it was not the patient's effort to get the heel to the ground that caused the deformity. In many, at the earlier examinations, this condition was overlooked, and when the patient could stand by leaning against an object, some physicians were inclined to make light of this condition because the child could flex the thigh on the abdomen. In some the psoas and iliacus acted well, in others the thigh flexion was most imperfect, being only accomplished by the tensor vaginæ femoris, and of course accompanied by marked abduction.

The early orthopedic treatment of the after-effects of poliomyelitis ought to leave the parts in a much better condition than has been the result with the other forms of treatment, and should enable one more satisfactorily to perform, when indicated, nerve or tendon transplantation or arthrodesis than has been possible heretofore. In addition, the large number of stretchings, tenotomies, myotomies, and fasciotomies should be reduced to a minimum, to say nothing of the more serious after-effects, secondary to the immediate results of the paralysis. It is unnecessary to more than refer to these conditions in this brief paper.

It is always a difficult matter in hospital work in a large city to trace patients. A surprisingly large number give false addresses or move between the first examination and the effort to trace them. Many others, and this is especially true of chronic and

rather hopeless conditions, change medical advisers frequently, so that the number of braces ordered represents a very large percentage of those continuing under treatment, and no attempt should be made to reduce these figures to a percentage basis.

The following conclusions may be drawn from a study of these cases. The majority of cases of poliomyelitis are followed by deformity. The amount of deformity depends on the character of the attack, on the muscles involved and on the treatment. Practically all of these deformities can be prevented by appropriate treatment. Deformities may occur very soon after the attack. The prevention of the primary deformities tends to greater degree of recovery and prevents the secondary deformities. Orthopedic treatment is desirable from the beginning.

SPECIAL ARTICLE.

II. STUDIES IN THE TREATMENT OF LATERAL CURVATURE.

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To any one familiar with the former literature of scoliosis, there is a source of satisfaction in the study of the more recent investigations of the affection as they indicate, as it were, substantial advance in the understanding of the nature of the deformity and of the principles which should underlie treatment.

The pathological anatomy of the deformity has been thoroughly studied by Hoffa and Lorenz and the nature of the disease and principles of treatment admirably shown by Schulthess in his exhaustive work. The laws governing the development of the deformity have received much elucidation from the work of Feiss. Böhm has shown by radiographic demonstration the influence of congenital defects of the spine in causing the deformity. The physiological movements of the spine have been most thoroughly studied by Lovett. Wülfstein has, in animal experimentation, demonstrated that curves can be developed in animals and as a corollary how much curve can be corrected by forcible means. Hoke has shown the results of surgical intervention and the effect of properly directed pressure upon the curves. The value of gymnastics, thoroughly applied, has been abundantly proven by many, while the experience of more than a century and the classical writings of Bamfield, Tamplin and Bouvier have shown the effects of mechanical treatment. The results from plaster-of-Paris corsets have been freely reported and the injurious effects of school-life made evident.

It is therefore justifiable to expect after the amount of knowledge accumulated, that a formulation of a method of treatment can be made which will be generally accepted as reliable.

At present, however, even admitting that the treatment of scoliosis has been improved, that the principles of treatment are well understood and that progress has been made, it cannot be claimed that in practice this treatment is as satisfactory as is desirable.

The methods of treatment which the surgeon relies on may be grouped as follows:

1. Correction by plaster-of-Paris corsets applied successively to a corrected position.

2. Means for stretching contracted ligaments and fasciæ—flexibility exercises.

3. Gymnastic exercises.

Plaster-of-Paris Jackets.

It has been demonstrated by many surgeons that this method is both effective and practicable. It can be applied in a way to exert all possible amount of force, or it can be used so that the correcting pressure is reduced to the minimum of physical discomfort. The disadvantages, however, in the use of plaster bandages are manifold. It is an extremely uncomfortable method; it is cumbersome; it is untidy and accompanied by such discomforts that the continuance of its use for the long period of the growing years is not feasible. Furthermore, its constant use is accompanied by the development of muscular weakness to such an extent that after removal of jackets a thorough gymnastic treatment is necessary to repair the damage inflicted by plaster corsets. When this method is employed it should be for the shortest possible period and it should be followed by light, removable corsets which are also effective in correction.

That some form of correction appliance is necessary during the growing years is admitted, as no gymnastic treatment can be continued during the whole of the twenty-four hours of the day. If an appliance will maintain a correct position with minimum amount of discomfort and with the least possible amount of in-

jury to the muscles, such an appliance will be of great advantage in the treatment of scoliosis as a supplement to, or substitute for plaster jackets. An examination of the various corsets and appliances in general use, however, indicates that there is room for improvement. Apparatus to be effective is too frequently heavy, unsightly and cumbersome, or if the reverse, of doubtful efficiency.

Correction Exercises.

In the less severe cases of lateral curvature, or where plaster jacket treatment is impracticable, correction by means of exercises is commonly employed. This is done either by free exercises, i.e., without apparatus, or by means of the fixation of the trunk by the aid of appliances.

In cases with structural changes free gymnastics have little if any corrective value and, while the value of correction exercise appliances has been proved by Schulthess, the complication and expense of the appliances employed have been such that they are available only by those who can frequent expensively equipped institutions, in larger cities and inaccessible to the majority of patients.

Gymnastics.

That children standing crookedly can be made to stand straighter by means of gymnastics is universally known and, as it is undesirable to apply the plaster jacket and corset treatment continuously during the growing years, and as correction exercises are impracticable for the majority of patients, gymnastics constitute the chief method of treatment in scoliosis in general use.

The efficacy of properly directed and conducted exercises is beyond question in counteracting faulty carriage, or even seriously flexible curves, but it is manifest that as a system it is inefficient to counteract a deformity with structural change or a vice of growth. Gymnastics cannot be carried out effectively daily for a long time, while the patient's growth is not limited to a few hours a day. The patient may exercise two hours and grow twenty-two each day. Unless supplemented by other treatment, gymnastics must in the severe cases be inadequate. In conjunction with

other treatment, however, gymnastics are evidently of the greatest value.

Admitting the soundness of the principles here presented, the difficulties of their application become evident and it is to these that the dissatisfaction with thorough treatment is to be attributed. As in a large number of cases the curves do not increase and the affection becomes self-limited, involving only a slight disability, the patients prefer to take their chances rather than be subjected to a tedious and wearisome treatment which interferes with the natural enjoyment of life. The treatment becomes practically neglected or relegated to mild gymnastics, imperfectly or partially carried out at brief intervals. The result is that a large majority of lateral curvature cases go untreated or, if treated, are only imperfectly treated.

A review of the literature of the subject will verify this statement, although in recent literature the possibility of a thorough cure has been abundantly shown and there is no question that curves can be corrected not only by forcible pressure but by systematic pressure exercises.

In the improvement of the methods of treatment of scoliosis it is desired that simple effective apparatus be furnished, which can be worn by patients without objection, continuously for years if necessary, designed to exert a corrective pressure without serious annoyance to the patient, or undue tax upon the care of the child. If, in addition to this, corrective exercises can be arranged with simple and cheap apparatus which can be directed by parents, without great discomfort to patients, without necessary attendance in institutions or hospitals, the possibility of effective treatment for scoliosis would be extended to a large number of those affected.

In order to determine if more can be done, it is well to consider the propositions when reduced to their simplest forms.

When a tree is seen to be growing crookedly it is a simple matter to straighten it by exerting a pull or pressing upon the side of the curve in the tree. It is manifest that if this could be done to the curving spine of a growing child equally satisfactory results could be obtained. Furthermore, dental surgery has

demonstrated that it is possible to correct bony distortions of the jaw by means of a constantly applied pressure. The problem reduces itself, in scoliosis, therefore, to a consideration of the possibility of exerting a constant pressure or correcting force upon the crookedly growing spine during the growing years, or, during this period or while there is a tendency to crooked growth, of the feasibility of subjecting the growing spinal column to correcting influences for a sufficient time to modify vicious growth.

The limitation to all practical attempts in treatment of these deformities is that the treatment should not be such as to interfere for a long period with the normal occupations and enjoyments of childhood, while admitting that unless treatment is carried out thoroughly for a long period, (i.e., during the period of growth) it will be ineffective or only partly efficient.

It is evident that the improvement should follow along the lines of the methods of treatment already proved to be beneficial. These may be mentioned briefly as the flexibility, or correction, exercises, correction corsets or jackets, and improvements in methods of gymnastics. The desiderata for flexibility exercises are as follows: first, exercises which will stretch such portions only of the spinal column where it is desirable that stretching should take place; second, appliances, where appliances are needed, which shall be cheap and simple in construction.

The following means will be found to be cheap, efficient, and not difficult of adjustment: A piping frame (Fig. 1) is made, 6 feet in height, and from 2–2½ feet in width and the same in thickness. To this is attached two sliding hooks which can be adjusted at any height on the rod. On these hooks a swinging rod is placed, in length reaching from 2½ to 3 feet and slightly narrowed in width than the width of the frame. This iron rod swing i furnished with straps at a desired point, and at the bottom are placed pieces of wood and ankle straps. These pieces of wood should be adjusted in such a way that they can be raised, and in this way the swing can be accommodated to any length that may be desired. On the back portion of the stand an iron rod is adjusted in such a way that it can be raised at any height and projected forward as far as is necessary. If the patient is placed with his feet upon the

wooden portion of the swing and the hooks from which the swing moves are placed at a desired height and the pressure bar placed in such a way as to press upon the prominent portion of the curve, it will be found that when the upper portion of the trunk is se-

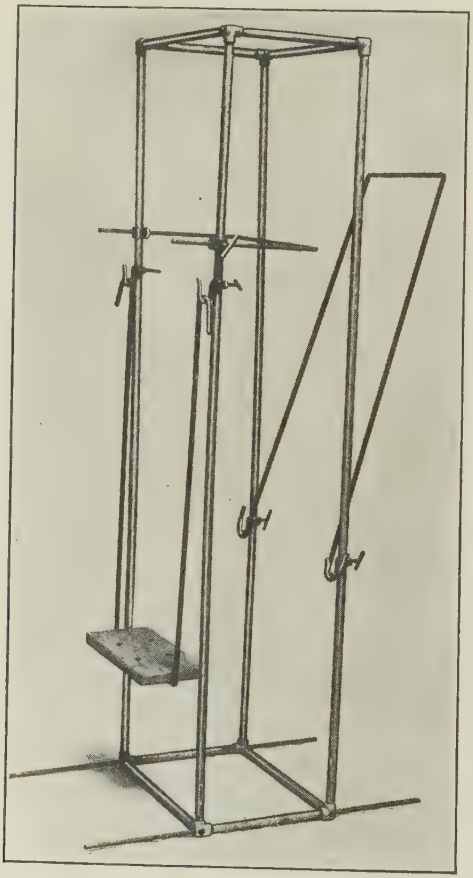

FIG. 1.—Piping frame with swing and pressure attachments.

cured by straps and by the patient's arms in any desired position, the swing of the lower portion of the patient's body secured by the swinging rod can be made to exert a correcting pressure at the desired point on the trunk (Fig. 2). It is of course necessary that the upper portion of the patient's trunk should be secured firmly to the

frame and the lower portion of this iron swing, and also that the swinging hooks should be placed at or near the level of the portion of the spine where there is the greatest need of correction. By an arrangement of straps, which is not difficult, and a proper

FIG. 2.—Frame with patient in position. Upper portion of trunk fixed, and lower portion swinging.

adjustment of the pressure bar, the patient can be secured in any desired position in order to make a diagonal, side, or an antero-posterior projection, with as much or as little torsion as may be necessary (Fig. 3). With this arrangement the portion above the curve is fixed and the lower extremities are used as a

pendulum for correction. It is evident that the lower portion of the frame should be secured firmly to the floor. By slightly inclining the frame the amount of swing correction can be increased if desired. Weights can be attached to the end of the swing

FIG. 3.—Patient in rectangular frame. Lower portion of trunk is fixed. Upper portion swinging back with resistance at the pressure bar.

increasing the pendulum active and a cord and pully attachment added or the exercise can, by the aid of a nurse, be made a passive rather than an active one. Where it is desired to fix the lower portion of the trunk and use swing correction for the upper portion, the same can be done by reversing the swing and arranging

that the patient sit inside the frame with the lower portion of the trunk secured by straps to the frame (Fig. 6). The swing can be arranged to fall backward and if the upper portion of the patient's trunk is secured to this, and the lower part is secured to the frame, the backward swing of the swinging rod can be used as a correcting force. Counter pressure can be exerted by a strap or an iron loop secured to the upright frame at any desired point. The force can be graded to a considerable nicety so that either

FIG. 4.—Infant cadaver applied to frame showing correction of spinal column in rectangular frame.

a slight amount of correction is employed or the amount of correcting force can be increased up to the point of the patient's endurance.

Another simple form of correcting flexibility exercise can be recommended, consisting of a single oblong piping frame, 2 feet in width and 8 feet in length. If the lower end is placed against the corner of the floor and the wall and the other end pressed against any portion of the patient's trunk, the pelvis and thighs being secured by straps to the frame, the lower portion of the trunk and

curve is reasonably fixed. If the patient carries a weight like an Indian club or dumb-bell in one or both hands and swings backward against the pressure of the frame, a considerable correcting force can be used (Figs. 5 and 6).

The 4-upright frame, already described, can be used in a variety of ways for correction exercises, either with the patient in the upright

FIG. 5.—Oblong frame corrective exercise. Trunk swung backward above. A resistance furnished by a light ladder placed at a desired point. The pelvis being held by straps.

or the recumbent (Fig. 9) position for passive correction. By means of straps the patient can be placed in any desired position and a suitable system of exercises arranged with strap checks to limit movement in undesired directions. These correcting exercises in conjunction with ordinary simple gymnastics can be made to fill the daily exercising time of the patient. They do not require

skilled supervision, necessitating only thorough co-operation on the part of the patient, the mother, or nurse, and the attending physicians. As has been said, the apparatus is very inexpensive and can be adjusted by anyone capable of receiving ordinary instruction.

Fixation Appliances.—The changes made by the Flathead

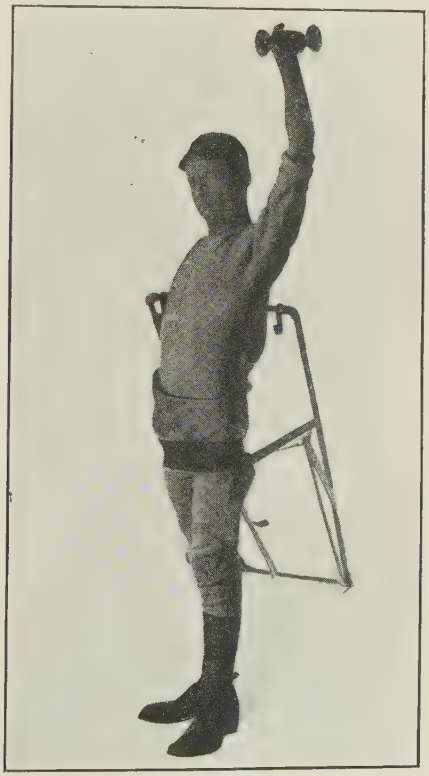

FIG. 6.—Oblong frame corrective exercise.

Indians in the shape of the skull furnish a sufficient evidence that a similar result can be accomplished in reshaping the growing thorax if as much attention is applied to the problem with intelligence, as is shown by the Indians or the Chinese in foot distortion for the production of a deformity. At present no appliance has been found as effective as the plaster jacket. The objection,

however, to the plaster jacket is not only that it is stiff and cumbersome but also that it causes an amount of muscular atrophy which is injurious and undesirable. There are two ways in which fixed plaster jackets can be improved: first, in the method of applica-

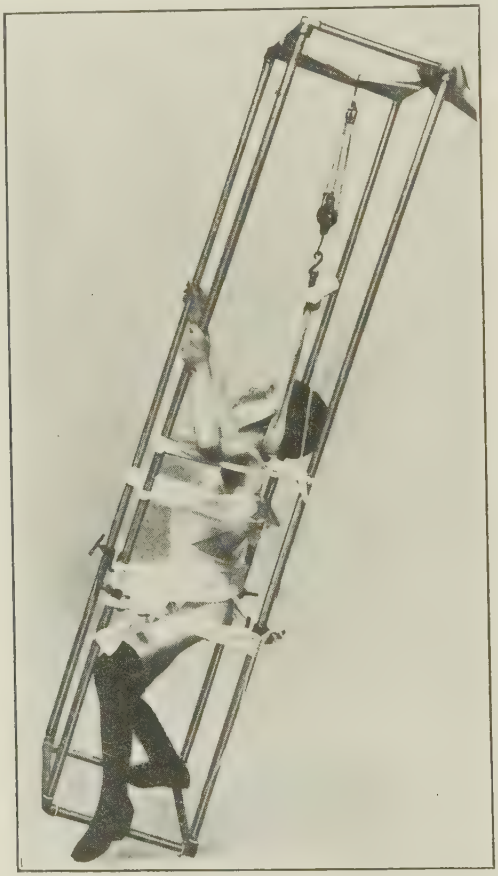

FIG. 7.—Patient in rectangular frame with correction straps tipped backward to diminish superimposed weight.

tion; second, in diminishing the amount of pressure area of the corset in order to enable the weaker muscles to develop rather than to atrophy still further. For the application of the plaster jacket nothing can be better than the 4-upright frame already described. It has this great advantage that the position of the

patient can be changed, as may be desired, from the upright to the recumbent or to the semi-upright. (Figs. 7 and 8.) The amount of correcting pressure can also be changed. The apparatus is, as is seen, inexpensive and requires no special skill.

FIG. 8.—Rectangular frame with correction straps applied to patient either for daily correction or for the application of a plaster jacket.

The usefulness of the plaster jacket depends upon its effectiveness, and to be effective it should be applied, except in the lowest curve, above the axilla and arranged so as to include the neck. If the jacket is applied in such a way that it is reinforced by plaster-of-Paris ropes or bands, as has been shown by Dr. Soutter, it is not

necessary that it be as thick in all directions as it is at the portion reinforced by the bandage and plaster-of-Paris rope. It is also advisable that the plaster jacket be cut out as much as possible in order to allow rib expansion in certain directions, so that respiration may be used as a correcting force. An admirable

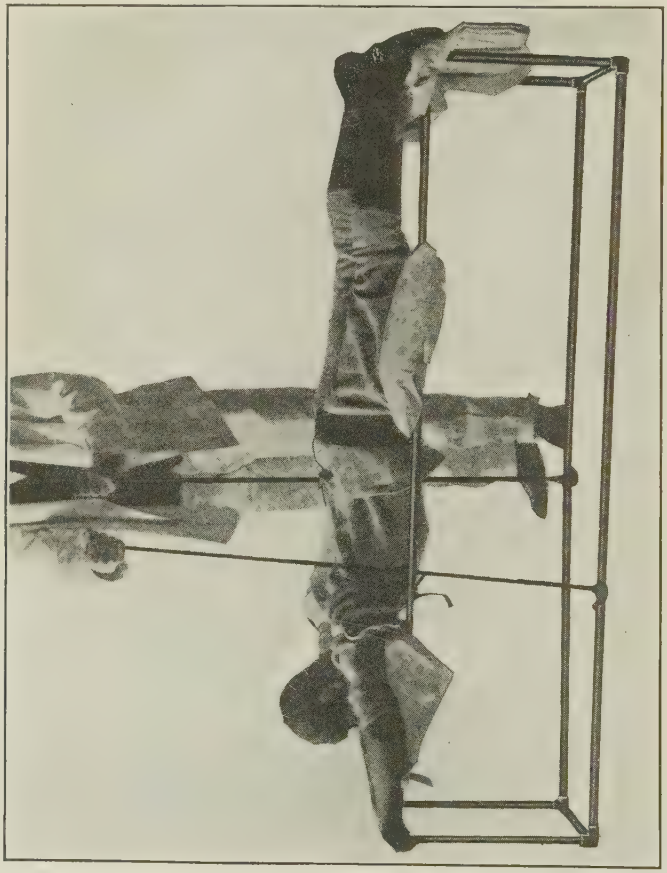

FIG. 9.—Correcting pressure by lever rods.

method of increasing the efficiency of plaster jackets has been recently shown by Dr. Hoke. In these ways, if pains are taken, the plaster-of-Paris jacket which is worn continuously becomes most effective with as slight discomfort as possible. But however plaster jackets may be improved they will always remain undesirable and uncomfortable, especially if they are non-remov-

able. Of the removable appliances those made of leather are the most effective, but these jackets are often cumbersome and thought less so than plaster-of-Paris corsets are sufficiently uncomfortable to justify the patient's objection to a long continuance of their use if this can be avoided. As usually made they exert compression upon the muscles and are therefore undesirable.

In order to furnish a correcting appliance which shall be light and as unobjectionable as possible, the following arrangement has been used: Flat steel bands, of such a temper and size that they can be bent by the surgeon's hands are used. Two of these strips are applied, reaching from the upper portion of the patient's neck on the side of the chief concavity down to the pelvis on the back, and in front from the lower portion of the abdomen upward to within 2 inches of the clavicle. These strips are connected below by a steel strip of similar size and thickness reaching three-quarters around the pelvis, a little beyond the point in front and behind at which the upright steel strips are attached. The upper ends of the steel strips are connected by a strong webbing band and from the middle a second semicircular steel strip is attached projecting in front a few inches beyond the front of the upright. These strips can be bent by the surgeon's hand so as to conform to the patient's trunk and to exert pressure upon three points; first in the back near the base of the neck, second, below on the pelvis, and third, in front upon the thorax at the prominent portion. The strap connecting the upper cross strips presses against the base of the neck. A triangular piece of leather is cut and made to connect with the back upright by means of straps fastened to the two buckles in the back upright and in front to the projecting portion of the upper semicircular band. In the portions of the brace where there should be stiffness, the upright is strengthened by riveting on an additional strip of steel; in other portions it can be bent as desired by the surgeon's hands, or by a wrench, but it will be perfectly rigid to side strain, as the cross-pieces prevent twisting of the uprights and secure side stiffness.

Then the apparatus is applied to the patient (Figs. 10, 11 and 12) and adjusted in such a way that not only the uprights press upon the points of the patient's trunk mentioned but do not press upon any

other point, and the triangular leather piece is applied over the portion of greatest projection of the ribs and properly strapped, it will be seen that correcting pressure is exerted to any desired extent

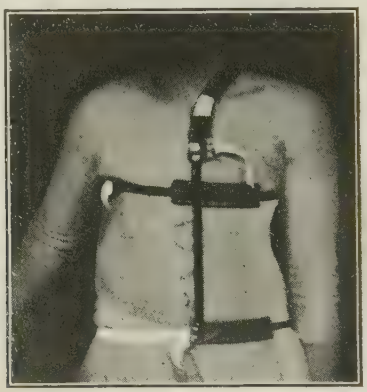

FIG. 10.—Front view without leather half corset.

on the curve and on the trunk as may be advisable, and little or no pressure elsewhere. If the semicircular upper cross-piece is properly shaped, there will be no pressure upon the sunken portion of the ribs in the back, and if the projecting front end of this

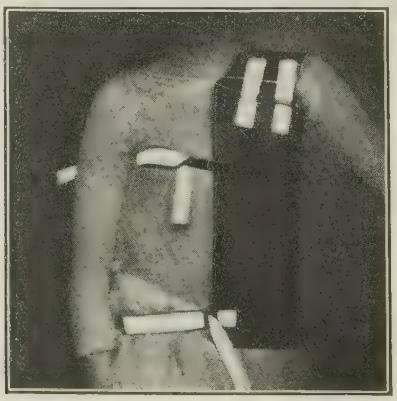

FIG. 11.—Front view with leather half corset.

cross-piece is sufficiently long and stiff there will be no pressure in front upon the sunken portion of the ribs by the strap connecting the triangular leather piece with the front cross-piece.

There will, however, be considerable pressure upon the projecting portion of the ribs in front and by the leather triangular piece on the projection behind. Counterpressure is exerted on the neck by a strap connecting the upper portions of the two rods, and below by a steel band at the pelvis. Attachments can be made to throw the shoulders back, if desired, and in cases of antero-posterior curves, the same principle can be applied with slight modification. In this way a light, strong, cheap and simple correcting appliance can be worn. It is not heavy, it is not unsightly, it is easily adjusted and can be made to exert a satisfactory amount of pressure without compression upon the

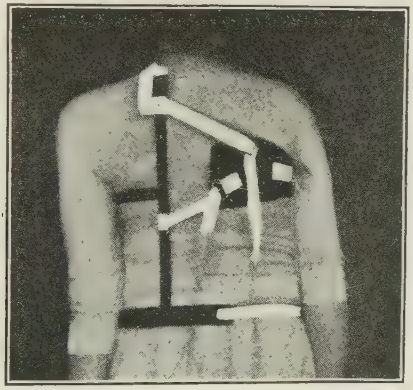

FIG. 12.—Back view without leather half corset.

portion of the ribs where no pressure is desired. Variations in the height of the upper semicircular cross-piece will necessarily be needed according to the variations in the curve. Some pains are required in designing the appliance, but no more than can be readily taken by a surgeon treating cases of this sort.

Night Appliances.—It is evidently desirable that the patient needing pressure correction should have this applied at night as well as in the day. The objection to most night appliances is that they are uncomfortable and do not allow sufficient freedom to ensure comfortable sleep. Although this may be endured for a time yet it constitutes a hardship which patients dislike. An appliance which does not compress or constrict, and which enables

the patient to lie upon either side, while exerting an efficient pressure in the desired directions, is a desideratum. The steel appliance already described is capable of being used at night but the steel rods may tear the bedding or night clothes, This can be avoided by using instead of the steel frame already mentioned a leather half corset reinforced by steels so as to utilize the same principle of pressure upon the greatest convexity and counter-pressure upon the neck and pelvis and upon the projecting ribs in front (Fig. 13).

In this way it is believed that, where it is desired, patients can be furnished with a constant correcting pressure, first, by means of

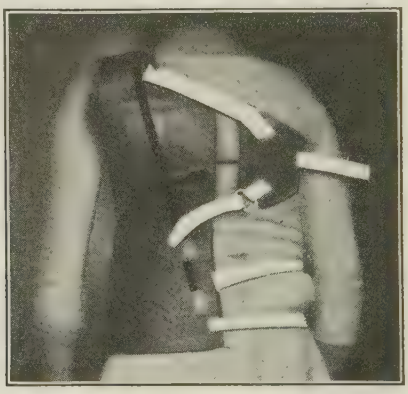

FIG. 13.—Back view with leather half corset.

a fixed plaster jacket; second, by means of a strong removable jacket leather or plaster, and third, by the use of a light day and night appliance which will cause a maximum pressure in connection with a minimum constriction and corresponding danger of muscle atrophy. It is hoped that the appliances just described will be found as effective and much lighter than those heretofore recommended and used and therefore less open to objection on the part of the patient, which will ensure a longer period of effective treatment.

Gymnastic Exercises.—The problem of the employment of proper gymnastics in scoliosis presents many difficulties. In the first place, those who have been engaged in physical culture have

not always understood fully the pathology of scoliosis and have treated the deformity as if it consisted simply of weakened muscles. In the second place, surgeons who have prescribed gymnastics have not been familiar with their purpose and have expected not only to correct a structural curve but to develop muscles as well. It is advisable for the surgeon to separate sharply the indications for exercises in scoliosis and to recognize that there are corrective exercises, designed to increase the flexibility of the spinal column and best done with the muscles relaxed, as well as developing exercises, to strengthen weakened muscular tissue. The former are helped by some mechanical aid, in order to prevent any increase in flexibility in the wrong portion of the spine. Developing exercises are used to strengthen the muscles which hold the patient in the proper attitude.

On examination it will be found that it is difficult to prescribe free exercises which will develop one set of muscles of the back on one side without developing also a set of muscles on the other side at a point below or above. It will also be seen that the statics of scoliosis are such that the muscles act differently when thrown out of the line from their normal action by the distortion of the trunk. The problem is also much more complicated than would be supposed by the contraction, stretching, and resistant contraction of the same muscle. If an individual leans the trunk to the side the muscle which pulls the trunk in the sidewise direction at first contracts and is exercised; after the trunk has been brought to a position of side bending the opposing muscles on the other side of the spinal column, to check overstretching, become contracted in resistance. If a side motion is given, therefore, it may exercise the muscles on both sides. If, therefore, it is intended that a certain group of muscles should be exercised, and those alone, it is sometimes advisable that the patient be secured in such a way that no motion should take place except such as would exercise that certain group of muscles. This, of course, can be done more readily if the patient is in a recumbent position and secured from bending in any undesirable direction, motion being allowed only in the direction which will strengthen any definite group of muscles. Symmetrical exercises, using as heavy weights as the

patient can bear, if employed with care, will be found of advantage in maintaining a balance which is a near approach to a normal attitude. Bars and dumb-bells can be utilized in a system of developing exercises, which need to be conducted under the direction of a surgeon and with considerable care. That this method is capable of good has already been demonstrated by Drs. Teschner, Ehrich and Twinch, who have shown that a certain amount of correction is accomplished by these developing exercises and the patient's effort to maintain a correct position.

Whatever means the surgeon may employ, the educational needs of the child constitute an obstacle to thorough treatment in difficult cases. It has now been definitely demonstrated that whatever the cause of scoliosis may be its development is increased during school years by school study. It is undesirable to deprive a patient of the advantages of educational facilities and school companionship during the whole of the growing years, but when the attempt is made by the surgeon to co-operate with the educator, requesting for these patients special school privileges and special gymnastics or time for gymnastics, difficulties are met at once.

Before a satisfactory treatment of scoliosis becomes generally possible it is necessary that the general public and the educator be made aware of the importance and advantage of some co-operation on their part in the correction of this distortion. It is not necessary to magnify the evil of spinal curves; they do not constitute the greatest danger to the community and are not comparable to such evils as tuberculosis, rheumatism or the infectious diseases, but anyone familiar with the physical defects and weaknesses of a large number of growing children cannot be blind to the need of some step by which our school children should be not only prevented from acquiring these curves, but that these curves should be corrected after they are acquired. There is no doubt that this can be done, provided, first, that the surgeon has a definite idea of a consistent treatment varying according to circumstances and carried out through the growing years, accompanied by occasional supervision of the patients and the enforcement of the proper treatment needed during the growing years.

Second: that the educators be alive to the need of such treatment and co-operate either by a proper change of the study hour, or the study requirements, or by the enforcement of such rules for exercise as may be given.

Third: that the general practitioner should be informed of the methods of treatment, which should be made as simple as possible, and should aid in the carrying out of the treatment needed, and

Fourth: that those engaged in physical culture and as gymnastic teachers should obtain a clear idea of what is needed and that their aid should be obtained in completing the cure.

It may be reasonably expected that when the medical profession is fully alive not only to the needs of the correction of this deformity but to the means by which this can be done simply, great improvements in the results of the treatment of scoliosis will be accomplished. It cannot, however, be expected that there is any ready road to the cure of scoliosis. A vice of growth needs constant attention during the growing years, but where that is given good results will be obtained.

EDITORIAL.

The accompanying editorial by Dr. Harry Sherman, of San Francisco, inaugurates a new feature in the publication of this Journal. It is hoped that in this way the Association may have put before it from time to time authoritative statements of the status of progress in the various fields of orthopedic activity. Much is undertaken and many articles are written in the hope and with the belief that advance is being made along particular lines. The process of separating the good material from the indifferent and bad is often difficult, if not impossible. A comprehensive editorial oftentimes clarifies the atmosphere and assists one in coming to a reasonable conclusion.

The treatment of bone and joint tuberculosis has been following well-beaten tracks for not a few years. The old debate regarding immobilization alone as against immobilization and traction had been fairly well settled; each man had arranged to be on one side or the other of the question, and then followed the even tenor of his way and orthopedic literature, which in the earlier days of special orthopedic practice had teemed with descriptions of braces and methods, dropped the subject, and the papers offered related, for the most part, to things not tuberculous. This must not be taken as evidence of indifference to the question, but rather as indicating that certain principles of treatment had been, for the time at least, considered as settled. It is interesting to see how this stable state is beginning to be unsettled and how even fundamental ideas are gradually being remodeled. Immobilization, imposing rest on the part, which has been the keynote of practice, is now not demanded in all cases, but motion is permitted within the range permitted by the lesion, and it may not only be permitted, but may even be insisted on if the hyperemia induced by the motion is thought or found to be beneficial. This radical

change has been, it is true, made by but a very few, but in making it they are following, rightly or wrongly, certain plain lines of argument, and it is quite certain that others will join them and that the tenableness of the position will soon be worked out. Traction, from which there have always been some dissenters, has lost more adherents, and not a few who had been educated in the traction school have been contenting themselves with immobilization alone, even in the treatment of the infected joint. It must be acknowledged that immobilization *plus* traction gives mechanically more complete rest that immobilization alone. This is granted by those who oppose the use of traction, for their opposition is based not on theoretic considerations, but on clinical results, and if they can get their patient equally well without traction as with it, as they claim to do, there can be no academic argument which can force them to use traction. Practically, the traction discussion is centered on the hip-joint and is involved with the debate regarding what constitutes the best result in a healed case of hip-joint tuberculosis. In the discussion there has been little said as yet about the ultimate shortening of the limb, and it may be that it is a point of minor moment; but it is still a point of some moment and may easily be one of major importance in an individual case. Tuberculosis tends to spread along the lines of pressure in bone and the failure to lessen pressure as much as possible may be to invite more extensive tuberculous invasion. This must be the final test of the utility or inutility of traction, and not the fact that pain or any other symptom may be put into abeyance without it. If traction saves bone and the bone saved is useful to the patient, traction must be used.

That a surgeon must be a physician also is conceded, and the orthopedic surgeon cannot escape the obligation. He has met the proposition by frankly recognizing what may be called the tuberculous side of his patient's case, and adopts means to combat the disease in general in addition to his efforts to control the local conditions. Of these the most successful has been the out-of-door life for skeletal tuberculosis as well as for pulmonary disease. The choice at present for tuberculous children is a place near the sea, and sea bathing is reported as being helpful, but the

probability is that an out-door life almost anywhere could give the result, as has been found to be the case in pulmonary tuberculosis. Living out of doors the patients improve in appetite, digestion and assimilation, they gain in blood state and in flesh; and local repair follows closely on the improvement in the general condition, provided the local care be continued. It is, however, sometimes difficult to carry with parents the point of the necessity for the local care when they can see the general gain, and in these instances there may be local loss in spite of general gain. The obviating of this difficulty gives a combination of local and general plans of treatment which promises, if applied to a large number of cases, to materially improve the percentage of recoveries as well as to lessen the amount of bone destroyed and the degree of mechanical disorganization of the joint, both matters of major local importance.

It is somewhat curious, however, that here in America a plan of treatment for bone and joint tuberculosis, which is directed especially against the tuberculosis side of the question and which has been in favor in Europe for more than a decade, should have received but scant attention. One paper has appeared in this country since the 1906 meeting of the German Surgical Congress in which the author thought it necessary to go into a full description of the inception of the method. No American clinic has cited a sufficient number of cases treated by the Bier hyperemia plan to warrant the formation of an independent opinion based on the results in that clinic alone, and the cases that are reported are sporadic accounts by scattered writers. These reports refer more to acute than to the chronic infections, tuberculosis included; but such accounts as are given of tuberculosis cases are to the credit of the plan. It has a limited application, however, for tuberculosis of the hip and spine, the most common seats of bone tuberculosis, cannot be subjected to it, and this may account for the lack of interest taken in it on the part of Americans. From Europe, however, come statistical reports of gain in time of treatment and in result attained which demand consideration and which are now, at least, getting it so that in a short time America will have its own opinion of passive hyperemia as an antitubercu-

losis treatment. Oddly enough, the method by itself reopened the immobilization question, for in it immobilization is practiced only in the acute stages of the infection, and for the rest of the time the limb is left to a great extent free, and even a certain amount of use is permitted or enjoined, both radical departures, as has been said, from time-honored and classical methods, but not necessarily reprehensible because of that.

In contrast to the comparative indifference to passive congestion has been the acceptance of Wright's teachings for increasing the patient's general resistance to the infection, for in not a few clinics classes of patients have been segregated for treatment by injections of tuberculin in accordance with their calculated tuberculo-opsonic indices. No observer, however, is yet willing to state an unqualified opinion, while the complexities of the technic make the method too expensive for all but the charity patients in the hospitals, so that up to the present time it has had but a limited trial. It is to be noted, however, that the opinion of those who have used it is that the promises are bright for the future, and it is more than likely that out of it may come a plan and a practice of more general applicability and undoubted value. One of these plans has already attained considerable favor. It seeks to gain the desired end by a short cut, using injections of tuberculin without the guide of the individual patient's tuberculo-opsonic index. This may be the play Hamlet without the player Hamlet, but he is at any rate on the playbill, for the initial dosage is that which has been indicated by tuberculo-opsonic indices which have been taken, and the subsequent dosage is guided by clinical conditions—and this seems the most that can be done in the average hospital at the present time. In addition to its use as a therapeutic guide for the injection of tuberculin, the tuberculo-opsonic index has a prognostic value and is credited by some with being able to solve that vexing question, "When can the brace be left off?" and the other puzzle as to the propriety or no of an operation.

Tuberculous abscesses in connection with tuberculous bones or joints are again being incised and cleaned out and sutured, and if the incision has been through a thick enough layer of sound tis-

sues the healing is said to be permanent, though what has been gained by the removal of the symptom abscess, if the bone focus still remains, is not stated. The Bier plan of local congestion is applicable to them, by the production of negative pressure under a Klapp cupping glass placed over the abscess after a small incision has been made in it. The extrusion of the abscess contents and the congestion of the walls are followed by healing and often, presumably, without the mischance of a secondary infection. The same plan applies to sinuses, and their stubborn nature is said to be changed so that they heal. Really, if the Bier method accomplished no more than this, it would deserve much credit, for these are most chronic matters. Apart from these items, the old rules regarding abscesses and sinuses hold good.

All of these considerations have applied to treatment that may be called essentially conservative—local treatment to permit local healing and general treatment based on a recognition of the pathology of the infection. But after all efforts by all plans, a certain number of cases will require more radical measures and operations will have to be done for them. Operations may be thought of as early or late interventions, and of these the former are most likely to be of benefit. Early operations have the great disadvantage that, if they are necessarily extensive, they interfere with the subsequent growth of the limb by their encroachments on the epiphyseal cartilage. But there is a class of early operations that have not been enough practiced and which may easily avoid the interference with growth. With our knowledge of the usual places for the location of the tuberculous initial lesions in the various bones, and with our ability to frequently demonstrate them by a radiogram, it is possible to operate for their removal with the intent to accomplish a radical cure. In a certain number of cases this will succeed, and in those in which it fails it will have done no harm if the surgery has been by clean methods. This operation manifestly can only be done on a bone that can be easily reached, as those at the knee, ankle and some of the tarsal bones and those at the shoulder, elbow and wrist. This operation is a joint- and a limb- and a life saving-method. Later operations

are done when conservatism is failing to conserve—either locally or generally—and in this is summed up practically all the rules enunciated by all the operators.

While operations in too young children are deprecated, because excisions and some erosions interfere with growth, it may be that delay, in the hope of saving the joint, has lost the limb and the life. It is difficult for a man who starts out on a definite conservative plan to find just the time when every possible conservative measure has been exhausted, and the sacrifice of joint or limb is demanded to save life. The question is really one of the difficult ones in surgical practice, and detailed rules can hardly be given to decide it. Practically, it never will be absolutely decided, for there will always be found dissenters from every decision which may be reached. If there is this debatable ground in regard to these interventions on the young, it does not exist if the patients be older. The recuperative powers, as against bone tuberculosis, wane as adult life is reached, and in addition the time for long conservative measures is lacking. Moreover, growth is almost or fully attained and the chief argument against intervention is gone. In addition to this, operations which sacrifice the joint to save the limb, if done early enough, give satisfactory results to both surgeon and patient and are thoroughly legitimate procedures. Finally, it seems almost a truism to say that amputation, to cut off and throw away a limb potentially dead is a surgical benefit, and it is a satisfaction to see in the literature, that after a frank acknowledgment of defeat in the management of a joint, one surgeon is brave enough to advocate amputation.

HARRY M. SHERMAN.

DISCUSSIONS.

Discussion of Dr. Freiberg's paper, A Further Report on the Treatment of Joint Tuberculosis by Marmorek's Serum.

Dr. Rugh asked what influence the serum had had upon the temperature in these cases. He, of course, surmised that when profuse suppuration was present, there was a mixed infection. He wished to know whether the serum had had any influence upon the septic temperature usually found in such cases.

Dr. Freiberg replied that in but one of the cases was there a high temperature. This case was that of a woman who had pulmonary involvement and died a comparatively short time afterward. There was no influence that could be ascertained upon the temperature of any severe case. In some of the cases in which there was no great rise in temperature, but simply the ordinary temperatures of unmixed infection, there seemed to be a distinct influence exerted by the serum upon the temperature, which seemed to be more nearly normal than before the serum had been administered. This is plainly shown upon the chart exhibited by Dr. Freiberg.

Discussion of Dr. Legg's paper on The Cause of Atrophy in Joint Disease.

Dr. Steele said he trusted this matter had now been settled forever, though the profession will be loath to give up the idea that the atrophy is due to reflex irritation of some kind. If a fracture through the middle of the thigh is put up in plaster of Paris, the bandage, though put on snugly, will become loose. The limb being inactive appears to have shrunk from non-use. This reasoning had been successfully used by Dr. Legg.

Dr. Hoffmann said that in cases where traction is used there is probably another factor tending to produce atrophy; that is, the constriction of the bandage used to retain the adhesive plaster. He supposed that those who have watched such cases had observed that in the cases in which traction by adhesive and bandage has been used, atrophy developed more quickly than in those simply immobilized. He thought, however, that atrophy is due more to non-use than to such mechanical interference.

Dr. McKenzie thought that there would be some difficulty in explaining the atrophy when immobilization has been adopted and the symptoms are acute. If there has been some laziness for a time, there is generally a marked atrophy in

hip disease in the gluteal muscles. Dr. McKenzie was inclined to think that these muscles in the affected limb had been subjected to more use than in the normal one, as they had had to keep the joint at rest. In the exercise of this duty, they had performed more work than had the muscles of the normal limb; but, notwithstanding the fact that their functional activity has been greater, atrophy in them is marked.

It would be difficult, also, he said, to explain why in these cases the bone atrophy is also a distanct factor in hip disease.

Dr. Galloway asked if it had been positively established that tubercular disease had been set up in the joints injected, because unless this had been positively proved it would be unsafe to draw conclusions from the laboratory experiments described.

Dr. Fitch asked whether Dr. Legg could tell him whether anyone had ever measured the thighs of children with congenital dislocation of the hip that had been put up in a double spica so as to tell whether a corresponding amount of atrophy is produced in such cases to that found in a case of joint disease that has been immobilized.

Dr. Legg, closing, said in reply to Dr. Hoffman's remarks about compression in the splinting of these joints, that great care had been taken not to use any compression. The adhesive plaster was put on very loosely.

As to whether the joints were involved in all cases, he said that all the patients showed a marked involvement of the joint.

Replying to Dr. Fitch, Dr. Legg said that he personally had not made any such observations, comparing the congenital cases with those found in disease.

Discussion of Dr. Nutt's paper on Tuberculin in Orthopedic Surgery.

Dr. Charles F. Painter, Boston, said that Dr. Nutt's presentation of this subject was most interesting, and that he had, like a good many others, been interested in the subject at the time that Dr. Wright was in this country. He had had a good many cases, in both adults and children, in the hospital, where there was opportunity to follow them in much the same manner as Dr. Nutt. had been able to follow his cases. Dr. Painter's results were neither so satitfactory nor so encouraging to him as the results in this series of cases had been to Dr. Nutt. This may have been due to a difference in the type of cases. Dr. Painter said that he and his coleagues had tried to imitate Mr. Wright's technic as closely as possible. They had one advantage, which Dr. Painter had understood from laboratory men is an important one, and that was that the tests necessary to make the opsonic observations were made at closer range. It is generally agreed that the interval elapsing between the taking of the blood and the completion of the test ought not to be more than a very few hours. Two hours being the most favorable length of time. Dr. Painter thought, however, that the results of treatment must be appealed to as the final test. Certainly, in his hands these had not been satisfactory. His study of the cases, which were about the same in number as those reported by Dr. Nutt, extended over a year and a half in most instances, and over two years in some. The results that

were obtained by Dr. Painter might be ascribed to the good hygienic conditions in which the children were placed, there having been no other treatment.

Dr. Charles Ogilvy thought that there was a good deal to be said for and against the subject. As regards the opsonic index, it is of but little practical value. It is well to know the opsonic index at different times; but so far as the value of it to the patients is concerned, it does not amount to a great deal. The injections of tuberculin are, however, of considerable value to the patient. Given every ten days or two weeks, irrespective of the opsonic index, they are very beneficial; but some patients improve to a much greater extent than do others. Dr. Ogilvy said that in these remarks he had referred exclusively to cases of tubercular joints.

Dr. Young said that as the paper had opened up the subject of opsonins, he would like to call attention to what he had said a year before in relation to the opsonic index in the treatment of infected joints. He then spoke favorably of it. In taking the index for streptococcic or staphylococcic infection, when this was done carefully and the injections were carefully given, the results were very satisfactory. The cases that were discharging pus profusely at the time this report was made have since been discharged from the hospital; and the index has become normal in some of these cases.

Dr. Nutt, closing, said that the blood for these experiments was all kept the same length of time. If the readings were not so high as in other experiments, the error was the same in each case.

He was afraid that he might have conveyed a wrong idea in regard to his own opinion of this work. He and Dr. Hastings did not think that they were curing the patients by this means alone. They did, however, think that the method assisted in curing the patients by putting their blood into better condition.

Discussion of Dr. Gibney's paper on The Influence of Weight-bearing on the Treatment of Tubercular Joint Disease.

Dr. Wilson had been deeply interested in this paper, because he expected to read a paper on the same subject in September. He had gathered together about twenty-five cases of which he hoped to be able by that time to report the end results. He had had three very great surprises. One was that he had obtained by the weight-bearing method advocated by Lorenz the best results that he had ever achieved. The second was that he had had by this method the most disastrous results that he had ever encountered. The third surprise was the manner in which the muscles of the patient's affected leg developed.

This last surprise occurred in patients who had been bed-ridden or kept in inactivity by crutches for a considerable length of time. A short hip-spica could not be kept on continuously because the leg developed to such an extent as to render a change of cast necessary in two or three months. In some cases he was able to keep the cast on for six months. Dr. Wilson then gave the details of an illustrative case in which the X-ray showed a typical loss of bone in the head

of the femur. A physician thoroughly capable of making a diagnosis had sent the case to Dr. Wilson as one of incipient joint disease. The spica was kept on for a year, with weight-bearing. Until a month ago, Dr. Wilson had not seen the boy for a year. He now has as perfect motion in one hip as in the other. It is impossible to tell from the function which hip was the one involved.

In regard to the possibility that weight-bearing will induce luxation in some cases and thus cause greater shortening, reference to which Dr. Wilson said had lately been made, he thought that the position of the limb when the spica was applied was of great importance. If the limb is held in a straight position, luxation may occur; but if the position of slight flexion, abduction, and external rotation be that of preference, the tendency will not exist.

Dr. Wilson agreed with Dr. Gibney that by making a correct selection of the cases proper for this weight-bearing method, better end results will be obtained than it has been possible to secure by confinement to bed, inactivity, braces or crutches. Care must be taken to select the appropriate cases, and not to bring disaster upon the method and the orthopedist by indiscriminate application of it.

Dr. Bradford stated that he had seen a number of cases that had been treated for hip-disease with weight-bearing and a short spica, in which the result was not beneficial, but disastrous. In regard to the explanation of this, he had also seen cases treated by traction, heavy splints, etc., for years, when splints were discarded the patient improved. He thought that the extent to which the splint treatment had been carried in some instances had been an absurdity. One should infer from what can be learned by a careful comparison of recent statistics in Europe and this country that although there are a certain number of cases in which weight-bearing is justifiable and salutary, there are many in which other methods would be preferable. In a certain number of cases, fixation and compression should be employed; and in a certain number, one will need to make use of traction sensibly applied, and that in a large number of cases, the greater safety lies with the more painstaking method.

Dr. David Silver, Pittsburg, said that, while he had used the method in a number of cases with a great deal of satisfaction, the result in one case had been most distressing. The patient, a little girl in whom the disease had lasted about a year, had forty or forty-five degrees of flexion and had been walking with the leg in this position; the radiogram showed a fairly good joint. She was put to bed and the deformity gradually reduced by traction, and a spica applied; some weeks were then consumed in getting her on her feet and a few more before she was discharged, wearing a short spica. She failed to return for observation as directed and when she did come back the head of the femur was found to be entirely destroyed.

Dr. Comptom Rielly, Baltimore, said that in going through the wards of the hospital with Lorenz he had noticed that the visiting orthopedist would shake his head on seeing legs in extension, and say, fixation is better. He, therefore,

thought that he would try the spica, and usually it acted very well; but lately he had had two cases in which it did not seem to do well. These were very acute cases. He put them in traction and kept them there a certain length of time, and then put a spica on and tried to let them go around; but the pain returned. He made several more attempts to let them wear the cast again, using traction between times. Finally, they were able to walk without pain, and since then they have been doing splendidly and walking around with the spica. He thought that if orthopedists were careful in selecting the cases, the results would be good. He considered it important to try as soon as possible to apply the spica and not keep the patients in traction too long. One should try it at intervals until it can be used all right. In one case he made three attempts before he succeeded.

Dr. Arthur J. Gillette, St. Paul, said that the American Orthopedic Association is not standing still: it is going either forward or backward. He had been brought up in an institution in which extension was applied in such cases. On going home, he practiced this method extensively. Finally, he found that some cases did so well with the immobilization recommended by Lorenz that he used this so persistently that his instrument-maker became worried. Then he found that there were some cases in which he could not relieve the pain without the use of extension. Later on he had another experience; that is, he found some cases that he could not relieve with extension, but in which he had to use a plaster-of-Paris cast. He concluded that one must treat the cases more individually. Some do better with immobilization, some with extension, and some with both. No hard and fast rule can, as yet, be laid down.

Dr. Peckham said, referring to the point that had been made that the cases should be carefully selected, that he would like to know upon what points selection should be made. The case that appears to be the mildest may turn out to be the very worst that one has had, and a case that looks wicked at first may prove to be very easily cured.

He also asked how a spica that extends only to the crest of the ilium and stops at the knee could prevent flexion deformity? He had seen cases treated in this way where flexion deformity resulted no matter how the plaster was molded. If plaster must be used, traction will be found much more efficient than fixation. Some cases demand one kind of treatment, and some another; but Dr. Peckham thought a great deal of damage would result from treating all cases with the short spica..

Dr. James K. Young, Philadelphia, said that he had used the plaster spica in adult and relapsed cases of hip disease. His experience of the Lorenz method had been gained by treating patients that had come to him after having been treated according to that method by other men or by Lorenz himself. Some had developed abscesses. Some of these cases had been selected by Lorenz and some by other surgeons. Personally, Dr. Young said that he had not felt tempted to use that method, as he considered it to be taking a step in a backward direction. In his opinion, the spica method cannot be used to advantage

except in the case of adults, and he considered that the traction method gives much better results in children.

Dr. Henry Ling Taylor, New York, considered the question of weight-bearing not settled one way or the other. The gentlemen who had said that some cases can be treated in that way were correct, and that those who had said that most should be treated by means of the protection of traction were also correct. Orthopedic surgery should not be so positive that high traction is necessary in all cases, though the speaker did not feel ready to adopt the dictum that all cases can be successfully treated with a short spica. He said that he and Dr. Gibney were situated somewhat differently. Dr. Gibney had been putting short spicas on and Dr. Taylor had been taking them off. He had found that a great many patients do fairly well with spica in a hospital, where they have little or no walking; but that within a few weeks after leaving the hospital many come into the out-patient department with their legs swollen and their joints painful. It is often necessary to remove the short spica in such cases, and protect the joint from weight-bearing. The speaker thought that orthopedic surgeons were indebted to the advocates of weight-bearing for a distinct advance in therapy, but he was not prepared to accept that treatment for the majority of cases in the active stage.

Dr. Gibney, closing, said that he was glad that the President had said what he had, as it was just what he wanted. He regretted that the late Dr. Phelps could not be present.

In regard to the case referred to by Dr. Bradford, Dr. Gibney had not meant to report it as cured; he had merely mentioned it in the hope that some of his colleagues had got it and that he could thus learn the end results. He has been trying to see whether it will turn up again in New York; but he thought that if it had gone to Boston, it must have got lost. As to the statistics of the Children's Hospital at Boston, of course he considered them valuable.

Dr. Gibney did not know that the method could properly be called Lorenz's, as it was known long before Lorenz was thought of. He had simply wanted to find out what the members thought of weight-bearing during the course of the disease. He said that he does not treat all his cases in this way.

In studying the cases by means of the radiogram, he had not always found these shadow pictures satisfactory.

He hoped that by the end of another year he might be able to secure some statistics on the subject, and he said that with this end in view he was trying to get a number of cases treated in the hospital. He thought it spoke well for the liberality of the hospital to hear the President say that his chief puts spicas on and he takes them off. As a matter of fact, all the members of its staff have the widest latitude in their treatment of cases.

In regard to the instrument-makers, Dr. Gibney said that they were almost out of a job. He had been talking to one recently who said that he used to take the summer to get up a stock of these instruments, but that now one side of the wall is full of hip-splints that he cannot sell.

The PRESIDENT asked if it were not true that Dr. Thomas advocated immobilization, and estimated weight-bearing.

DR. GIBNEY replied that Dr. Thomas did not use weight-bearing for hip disease. He put the patients on their back, injected every joint and put on a moderate degree of traction.

Dr. Gibney thought that it was only fair that the Association should hear from Mr. E. Muirhead Little on this subject.

Mr. LITTLE said that orthopedic surgery in England does not include cases of active joint disease. As the result of this, orthopedists there do not get many of these cases. Therefore, he could not be considered as an authority on this subject.

As Thomas's pupil, however, he could say that the latter certainly never left a case in the active stage of hip disease have weight put on the joint. His measures were directed to fixation, motion, and allowing the patients to get plenty of fresh air. He recognized fresh air and exercise as valuable in the treatment of such cases. He put a high sole on the shoe of the other foot, so as to avoid having that of the diseased side put to the ground.

DISCUSSION of DR. RIDLON'S and DR. BLANCHARD'S paper entitled: A New Treatment for Old Tubercular Sinuses.

DR. EMIL BECK said that the method is not entirely without fault, and that he would try to pick the flaws in it so as to put the members of the Association on their guard against them.

The results of the use of bismuth in tuberculous sinuses are so surprising in cases that have appeared hopeless that one may be led to employ it in cases in which its use is not indicated. Its use is contraindicated in biliary fistula; and, for obvious reasons, it should not be used in cases in which it is possible for it to compress structures, such as the brain, the spinal cord or the pancreatic duct. Compression of the latter will produce pancreatitis with fat-necrosis.

The method should be developed conservatively. Although its use is not attended with much danger, no accident having occurred in Dr. Beck's experience of several thousand injections, they are not impossible. The melting-point of the solution is fixed at 103°, so that when the body temperature should rise that point, due to retention, the solution will flow out and the temperature will subside. There is, however, a possibility of the bismuth's producing a toxic effect. Dr. Beck had looked through the literature of the subject as far back as 1882, and had found cases of poisoning reported due to bismuth's having been used in fresh wounds. The symptoms were a black border of the gums, cyanosis, headache, nephritis, diarrhea and a subnormal temperature. There are, however, no recent reports of poisoning by bismuth, except five years ago three cases due to local application; Rieder has given 40 ounces of bismuth by stomach in one dose, in order to obtain radiographs of the stomach, without noting any symptoms of poisoning, but children are more susceptible to the poisoning effect of bismuth given by mouth. Several cases have been recently reported, but none proved fatal. Dr. Beck had injected 32 ounces of a 33 percent paste

into the pleural cavity in one case. The patient got headache, slight cyanosis and a subnormal temperature, but the symptoms improved in a few days and have not returned, although the injections were repeated. Dr. Beck has noticed some cyanosis in children during treatment, but it did not affect their health, for, as a rule, they gained in weight.

The method is not intended to displace other methods, all of which play an important part in the treatment. Tuberculosis is now being attacked from all sides, and most of the leaders in the movement are advocates of an out-of-doors life. The patients that Dr. Beck has exposed to fresh air in addition to the bismuth treatment are the ones that have improved the most rapidly. The Bier's treatment for tubercular joints is not to be thrown aside. Those who have had any experience with it have spoken very favorably of it. The bismuth-injection treatment is a new addition to our accepted and useful older methods, it should be tested, and then given its proper place in the treatment of tuberculous sinuses.

Dr. Wilson considered this paper one of the most valuable contributions to the literature of tuberculosis that had been presented within his knowledge to the American Orthopedic Association. As Dr. Beck had said, all the members were acquainted with the disquieting character of the symptoms that occasionally seems to accompany the use of the bismuth injections, and also with the opposition that has been aroused surgically to the attempted closure of any of these long-standing sinuses. Attempts have been made aseptically, by means of free incision and thorough drainage, to get them to close. Some have done so for a short time and have then reopened.

Dr. Wilson said that his personal experience with the Beck method had been quite in accord with Dr. Blanchard's. He had had eleven cases. He had been greatly impressed with Dr. Blanchard's statement about the toxic effect of bismuth, and had wondered whether any attempts had been made by him or by others to use the first fluid for diagnostic purposes only and then use the paraffin injection without bismuth. In several cases it had been pretty clearly demonstrated to him by means of the X-ray that the first fluid, melting at a lower point, was better for small sinuses; and that the second, hardening with greater rapidity, would enter with more difficulty. In the second injection, he could not get so large a quantity into the sinus as with the first. He thought it was because the sinus had closed as much as one-half in three days' time, but he now thinks that it was because of the more fluid character of the first than of the second. He thought that in some of the cases it would be of advantage to incise the sinus freely and wipe it out thoroughly, thus making a better field for the injection of the fluid; and in one case he resorted to this method. The sinus had already been opened and cleansed four or five times, and he did it again, getting rid of all abnormal tissue. After almost completely sewing up the wound, he injected the mixture of bismuth, paraffin-wax and vaselin, forcing it in with great care. He was surprised not to get a splendid result, as he had already removed a great deal of the abnormal material, which Beck's

method was supposed to get rid of more slowly. The effect, however, was really worse, for the patient had to suffer, in addition, with the effects of the surgical shock, etc.

Dr. Wilson felt that this method of treating tubercular abscesses might be used to advantage with the old treatment of aspiration, with the walls left intact. He thought that a vote of thanks from every orthopedic surgeon and every patient should be conferred upon Dr. Beck.

Dr. Davis asked whether any bad effects were likely to arise from the use of paraffin and vaselin, both of these being mineral in character and the former apparently almost non-absorbable. After the use of paraffin in subcutaneous injections, the material remains in the tissues almost indefinitely. He asked whether it might not be desirable to use a vegetable or animal substance instead of the paraffin.

Dr. Davis had not used the bismuth, but he had used fairly extensively Mosetig-Moorhof's mixture of iodoform, spermaceti and oil of sesame or olive oil, and it acts very much as does the bismuth mass.

Dr. Freiberg said that for several years he had been accustomed to use iodoform. For the last two years, he had used bismuth, in order to diagnosticate the extent of these fistulous tracts. He used a very thin suspension, however, and held it in the tract by inserting a plug of hard paraffin-oil, held in place with adhesive plaster. The material was allowed to flow out immediately afterward. For this reason, no curative effects upon the fistulous tracts were obtained. He hoped he should soon have some experience with the method advocated by Dr. Beck.

He thought, however, that a word of warning should be sounded, lest it should be used unwisely. He felt that this matter had been in the minds of both the reader of the paper and Dr. Beck, although they had felt it to be unnecessary to speak of it before an audience composed of orthopedists. As long as there is destruction going on at the seat of disease, it will be useless to close the fistula; because more material will be breaking down. It is not claimed that the method will cure the tuberculosis that produces the abscess, as its action is chiefly mechanical.

Dr. Freiberg then referred to a case that he had just seen. The patient was a child with ankle tuberculosis that had been treated in a Southern city. She was suffering great pain. The ankle was greatly swollen, and it was for that reason that the parents were dissatisfied with the treatment given. Dr. Freiberg made a radiogram and found a typical infarct at the lower end of the tibia. He also saw a distinct shadow of which he did not know the meaning. Upon inquiry, he learned that bismuth injections had been resorted to. The parents spoke of it as the "Chicago treatment," but they had not thought it necessary to tell Dr. Freiberg about it. The child had no fever when he saw it. The bismuth injected had not entirely escaped, and he felt convinced that it had simply permitted the accumulation of detritus and fluid material, which were responsible for the extreme pain.

In this method Dr. Freiberg thought the profession has a very valuable therapeutic agent, but one that will have to be used with judgment. As long as the disease is active, danger may result from the retention of products above this plug, on the one hand; on the other, although one may be able to close the sinus by this means, one should realize that it is not the sinus that is being treated, but tuberculosis of the joint, and that measures for the relief of the disease must not be omitted.

Dr. Philip Hoffmann, St. Louis, said that although he had been impressed with the results achieved by this method, a thought had struck him in regard to its use in diagnosis. All have observed in the radiograms, especially one of a case of Pott's disease, the surprising number of sinuses indicated, and Dr. Hoffman wondered whether it was possible that some of these sinuses might be dissection sinuses due to the injection of the bismuth, which might dissect laterally in various directions. He thought this possible especially in the loose tissues of the pelvis and abdomen, although he did not know the force that had been used in making the injection.

Dr. Rugh remarked that some years ago, after the first employment of subcutaneous paraffin injections for the correction of deformities of the soft parts of the nose and face, some extensive examinations were made; and one authority reported the results of the examination of a part that had been injected some years previously. A miscroscopic examination was made of some sections of this part after death, and it was found that nature had been appropriating this material by throwing out new tissue through the injected mass, so that it was actually becoming a part of the body.

Dr. Blanchard, closing, said that he was sorry that Dr. Ridlon was not present, as the paper was a joint one, and he had expected Dr. Ridlon to be there to discuss it. However, he would answer the several questions asked.

The bismuth treatment was not addressed to the treatment of the disease; but most of the patients were being treated for their various diseases by means of plaster-of-Paris spicas and jackets, sunlight, fresh air, etc., at the same time that the bismuth treatment was being pursued. Attention was directed first and mainly to those old sinuses, which, as Dr. Wilson had remarked, never heal, and in which the exudation of pus is a constant drain upon the system, causing the patient to grow thin and weak. Later, it was thought that the bismuth paste might serve a good purpose in the opening of the so-called cold abscesses, and for this it was found very effective.

As far as toxic effect is concerned, Dr. Blanchard said that in the twenty-four cases in which he had used the bismuth paste, it seemed to be quite innocent. He then passed around a one-ounce cone-point glass which was one of the smallest used for the purpose, and remarked that the size varies from that to one eight times as large. The nozzle of the syringe was applied directly to the orifice of the sinus. He saw no advantage in using a canula.

The method had not been tried by them in acute inflammatory conditions.

and they did not expect to use it in such cases. It had so far been employed only to open the two cold abscesses described and for old chronic sinuses.

The force used was certainly not sufficient to open up a new tract in any direction, and Dr. Blanchard saw no reason for changing the formula that they had employed. When injected at a temperature only four or five degrees above that of the blood, it is well tolerated by the little patients, who very seldom cry. The only objection to it is when distention comes. As soon as a child cries, we know that the full capacity of the abscess sac is reached and cease the pressure. Usually, however, there is no complaint at all on the part of the patient. Neither of the two patients injected at a clinic held the day before had made any complaint. Within three minutes the number two formula is cold enough to retain its place without being lost from a fistula with an ordinary-sized opening. Dr. Blanchard had not seen any bad effects from the formulas, but he said that if any were met with, the formulas could be modified.

Dr. Blanchard explained that in order to cool the paste, they put alcohol on a piece of gauze and wrap it around the filled syringe. The evaporation of the alcohol cools the syringe and its contents sufficiently for use in ten or fifteen seconds.

Dr. John L. Porter, Chicago, said that he had seen a large series of cases in the same line, and found that it is often convenient to have a much larger syringe than the one exhibited by Dr. Blanchard. Wrapping a hot towel around the syringe prevents the mixture from solidifying during injection. A syringe holding four times as much as the one shown had given Dr. Porter the best satisfaction.

REPORTS OF SOCIETIES.

The JOURNAL proposes to offer its readers under this newly organized department reports and, where possible, more or less full abstracts from society meetings where matters of orthopedic interest are discussed, as well as from the foreign orthopedic societies, notably those occurring in France, Italy and Germany.

At the recent meeting of the National Society for the Study and Prevention of Tuberculosis, held in Chicago, there were a number of papers read bearing on the use of tuberculin for diagnostic purposes by the method of Calmette and by the vaccination method. One of the members of the Association has been good enough to give short abstracts of these papers, thus enabling us to be in possession of the consensus of opinion of those working on this matter Papers on this same topic, representing observations made at Saranac and elsewhere were presented at various sections of the American Medical Association at Chicago, in June, 1908, but have not yet appeared in print.

At the recent meeting of the American Surgical Association no papers were presented having any particular bearing upon orthopedic subjects.

At the general meeting of the American Medical Association the following papers were presented which are of interest to orthopedists, viz.: In the Section on Mental and Nervous Diseases, J. H. W. Rhein, of Philadelphia, read a paper entitled, "Spondylose Rhizomelique." Two significant papers were presented by Dr. M. Allen Starr, of New York, and Dr. R. W. Lovett, of Boston, on the subject of "Infantile Paralysis." The first-mentioned writer read before the Section on Nervous and Mental Diseases and the second before the Section on Surgery and Anatomy. Before the Section on Ophthalmology, Dr. H. C. Parker, of Indianapolis, read a paper upon the "Ocular Reaction to Tuberculin." Author's abstract, taken from the official programme of the American Medical Association, is here given.

"1. Technic of reaction and its results by various observers. 2. Comparative diagnostic value of subcutaneous injection, vaccination and ocular reactions to tuberculin. 3. Is ocular tuberculin test harmless? 4. Ocular reaction in ophthalmology. 5. Frequency of eye tuberculosis. Conclusions: 1. Ocular tuberculin test of as great diagnostic importance as any other single test. 2. Positive reaction indicative of tuberculous focus somewhere in body. 3. Test uncertain in patients under two years. 4. Test fails in advanced cases. 5. Initial instillation should be preferably under 1 percent. 6. Second test should be made in eye not previously used 7. Consensus of opinion against using the test in eye not wholly normal. 8. After-complications from use of test 9. Number of ophthalmic affections due to tuberculosis greater than formerly. 10. Ocular reaction especially valuable for ascertaining the tuberculous nature of many eye affections. 11. Solution of Koch's "old" tuberculin nearly as good as Calmette reaction for diagnosis. 12. Test given such excellent results that value is assured."

Is Calmette's Ophthalmo Reaction Free from Danger? Ernest Thompson —*The Ophthalmoscope*, July, 1908.

After a brief introduction, the writer reviews a great deal of the literature on the subject and comes to certain conclusions:

That a constitutional reaction relatively rarely occurs.

That the application of tuberculin to eyes which are not absolutely normal is risky.

He cites various authorities: True and Maillet, Kalt, Brons, Ramsey, Barbier and others, where severe inflammation was lighted up in healed lesions in the normal eye of patients where the other eye was affected, and another case where the eyes were healthy but the lachrymal sac was involved.

That the local reaction on healthy eyes has dangers.

He cites Walker, Heywood, Reuon and others, where very obstinate conjunctivitis has resulted and a few where corneal ulcer occurred. These cases had been noted where the strength of tuberculin used was one drop of a half of one percent solution.

The Present Position of Vaccine and Serum Diagnosis and Treatment in Eye Disease. Percival T. Hay.—*Ophthalmoscope*, July, 1908.

An excellent review of the various tuberculin tests. The remainder is devoted to serum treatment in eye conditions.

Eine Warnung vor der Ophthalmoreaction. O. Stuelp.—*Klin. monatsbl für Augenheilk.*, March 1908

He first relates the statistics of Krause and Hertel of 1500 cases Of these tuberculosis reacted in 80 percent; suspected tuberculosis, 50 percent; free from tuberculosis in 40 percent.

Seven cases are then cited from the Mülheim Klinik of severe conjunctival or corneal involvement following the instillation of one drop of a ½ percent solution of tuberculin.

SEVENTH CONGRESS OF THE GERMAN ASSOCIATION FOR ORTHOPEDIC SURGERY.

SESSION I.—*Friday Evening, April* 24, 7.30.

The features of the evening were the papers read by Schanz and Schultze and the discussion following them.

1. Schanz, Dresden: Results of forcible correction in cases of severe scoliosis.

Photographs were shown of results by forcible correction in plaster.

In the discussion Cramer, of Cologne, showed a large number of photographs demonstrating cases in which lumbo-sacral variations had produced the scoliosis. His findings approved the theory of Böhm. Böhm stated that in the treatment of scoliosis a distinction should be made between those due to rachitis and those corresponding to his so-called idiopathic scoliosis, which latter he thinks are due to developmental-anatomical changes. Schulthess, in closing the discussion, suggested that an investigating committee be appointed with regard to Böhm's theories, which he considered a great progress in the problem of scoliosis.

2. Schultze, Duisberg: On the treatment of deformities of the lower extremities.

He demonstrated apparatus for bloodless treatment of the deformities of the lower extremities. He showed that beautiful results could be obtained by mechanical means not only in deformities of the foot, but also in other parts of the lower and in those of the upper extremity. His results led him to make the statement that bloody treatment of these deformities should be considered a "Kunstfehler."

The discussion was very spirited and participated in by Lorenz, Bader,

Müller, Gocht and others. All appreciated the high results reached by him, and agreed that bloodless methods in the treatment of foot deformities are the best, but they also thought that there are still many cases in which the bloody method is indicated. Lorenz called these cases, with regard to club-foot, "refractory cases." Lange was of the opinion that bloodless reduction of club-foot shows better results in after-life.

3. Joachimsthal, Berlin: Congenital elevation of the hip as part symptom of other congenital anomalies.

He reported ten cases where other deformities accompanied the luxated hip, such as torticollis, luxation of the radial head, genu recurvatum, double hip with club-foot, right equino-varus and left calcaneus accompanying left luxated hip, absence of femur on side opposite the luxation, double luxation with spina bifida and unilateral luxation with spina bifida. One case was added in the discussion by the author, where there was a shortening of the humerus, lack of one finger, bilateral luxation of the hips, and knees and double club-foot.

4. Guradze, Wiesbaden: Results of osteotomy of the femur.

He advocated the oblique osteotomy in coxa vara and ankylosed tubercular hip.

Discussion.—Lorenz advocated subcutaneous osteotomy, especially in ambulatory cases. Osteotomy in long bones, osteoclasis in the foot. Drehmann, of Cologne, advised osteoclasis till the age of 5, osteotomy after that age.

Session II.

Schulthess, in opening the morning session, read eulogies upon Heine, Hoffa, Peterson, Von Esmarch and Perl, who had died during the past year.

Among other things, he stated that orthopedics had demonstrated its usefulness and must be separated from general surgery. That the institutions for cripples must form a necessary subject for othopedics. Not only is it the province of orthopedics to cure deformities, but to prevent it by producing a healthy generation.

The following papers were read:

5. Fischer, Leipzig: On the action of muscles.

He showed of what interest the physiology of muscles was to the orthopedic surgeon in the matter of tendon transplantation. Unless mechanically hindered, both ends of the muscle come into play, the action and reaction being equal. The muscle acts not only upon the joint, but upon the whole body-segment; and not only upon that joint to which it is attached, but also upon more distant joints.

Discussion.—Lange, München, attributed the failures in his cases of tendon transplantation to adhesions formed in the surrounding tissues. He therefore bores a canal through the superficial fascia and takes as much of tendon sheath and fat as possible in order to keep the tendon as far as possible from structures which could produce adhesions. He begins active exercises at once to prevent these adhesions from forming. Vulpius was of the opinion that the old method of implanting one tendon upon another gives better security. Riedinger, Würzburg, asked if a muscle could be torn off from its insertion spontaneously, and at which end this rupture is more liable to occur. Fisher, in answering, stated that since the tension was equal at both ends, this rupture depended upon the frmness with which the tendon is inserted and the size of the surface to which it is attached.

6. Böcker, Berlin: On myocitis ossificans.

He presented a patient in whom two months after the reduction of a luxated

elbow-joint a severe periarticular ossification set in. He thought it was periosteal in origin and advised operation in cases where growth is already attained.

Discussion.—Bardenheuer operated upon 6 cases of periosteal myositis. He thought that by using his extension apparatus such growths of callus could be avoided. Drehmann reported a case where the myositis was of muscular origin; Wullstein, one case of periosteal and another both periosteal and connective tissue. Those of periosteal origin, he stated, recur more often than those of fibrous origin. He warned against employing massage too early, especially in children.

7. Riedinger, Würzburg: On changes occurring in the extremities of rabbits after epiphysiolysis.

In some cases no changes occurred. In others disturbances resembling those of rachitis were observed. These latter were temporary and occurred more frequently where the epiphysis was injured.

Discussion.—Lorenz had observed no shortening after epiphysiolysis of the femur.

8. Gocht, Halle: A case of osteomalacia in a male 45 years old. Of 9 years' duration, with typical symptoms. X-ray showed coxa vara and beak-shaped pelvis. Pains disappeared with limb in plaster in abduction. Now walks in apparatus.

9. Werndorff, Vienna: Ossitis fibrosa Recklinghausen.

Spontaneous fracture in patient under 20. Metastatic tumors appeared, following sarcomatous growth in the inflamed bone structure.

10. V. Aberle, Vienna: Peculiar bone and joint process. Pain in joints of hand. Destruction of distal end of ulna. Had similar process 15 years ago in elbow. Resembled lepra.

11. Chrysospathes, Athens: Intrauterine fractures and curvatures of long bones.

Intrauterine fractures in two successive children of the same mother. Thinks it is osteogenesis imperfecta.

12. Cramer, Cologne: On the healing of wounds of the articular cartilage. If cartilage alone is injured, no change occurs, but when the bone is injured, a vascular connective tissue is thrown out by the medulla. The cartilage itself does not proliferate.

13. Heusner, Barmen: New braces and bandages.

Aluminum covered with webbing makes a yielding, but firm splint and brace.

Evler, Treptow, showed an apparatus made of crome leather. He presented a patient with luxated hip wearing such an apparatus.

14. Foerster, Breslau: A new operative procedure for the treatment of spastic paralysis by resection of the posterior nerve-roots.

A great impression was made by the reading of this paper and the cases presented. It dealt with the treatment of certain cases of spastic paralysis by cutting the posterior nerve-roots after laminectomy. This destroys the reflex or prevents spastic reflexes. Before the operation is proceeded with, the neurologist should ascertain what nerves are involved. Two cases were presented, one a boy nine years old in whom the paralysis had existed since birth. The posterior roots of the fourth and fifth lumbar and first sacral were removed. The child can now walk about without assistance and can make use of its upper limbs. The second case had been operated upon but one year ago and the improvement is slight, she can make several steps alone. Professor Tietze, of Breslau, had performed the operation, and in the dis-

cussion stated that the operation was surrounded by grave difficulties; that of 14 cases operated upon 7 died. It should be performed only in most severe cases.

SESSION III.—*Afternoon.*

The following papers were read:

15. Karch, Aachen: Technic of tendon plastic. Showed a new instrument.

16. Bade, Hanover: Technic of arthrodesis.

17. Gocht, Halle: Pathological research in congenital luxation of hip. There is an anteversion of the neck and retroversion of the head.

18. Ludloff, Breslau: Bloody reduction of cong. disl. of hip.

He makes the incision in the inner side between the adductor magnus and gracilis. Had operated upon 5 cases successfully where the bloodless method had failed.

19. Frœhlich, Nancy: Results of cured congenital dislocations of hip.

Out of 240 cases he examined 80, and found coxa vara in 4; total disappearance of the neck in 2; tubercular coxitis, 2; traumatic luxation, 1; infantile paralysis in 1.

Discussion.—Wullstein had observed bilateral cox avara in a case in which he had obtained good result by the Lorenz method.

20. Becher, Münster: Pathological hip-joint luxation.

One case followed a severe burning in first year of life. Good results in several cases.

21. Lorenz, Vienna: Therapy of old traumatic hip luxations. Advised transposition of head.

22. Deutschlander, Hamburg: Traumatic flat-foot.

Does not advise plates, but mobilization and exercises; and where fracture and dislocation of fragments existed, open operation.

23. Wullstein, Halle: Arthritis deformans. Presented human and animal specimens. He found softening, and both atrophic and hypertrophic changes.

SESSION IV.

The evening session was devoted to papers upon the care of cripples. Riesalski, of Berlin, and, Rosenfeld, of Nuremberg, have started a systematic collection of statistics in regard to the number of crippled persons in the German Empire who were unable to support themselves. The authors attempted to show the loss that the nation sustained through the presence of such a large number of unproductive citizens and to outline a system whereby the economic disadvantages could be remedied. With the help of the government they have been able to follow out their scheme in a very minute way, and have now established two so-called *Krüppel Heime.* These are establishments connected with the hospital, and are similar to the American industrial schools for cripples.

In the lengthy discussion of this subject, in which not only orthopedic surgeons, but representatives of the government and clergymen took part, it was shown that the social care for cripples in Germany had reached a critical point.

In the same discussion the orthopedic surgeons took the opportunity to fight for the further existence of their specialty and to show their *raison d'être.* In Hoffa's death orthopedic surgery in Germany has lost its chief representative, and immdiately after his death the question arose whether orthopedic surgery should continue as a separate branch in medicine. The general surgeons tried to bring orthopedic surgery back to their general surgical clinics, and thus to place this specialty where it had been fifty years ago

The orthopedic surgeons tried to demonstrate in this discussion by means of this question of the cripples, how important it is to have central institutions for orthopedic surgery in order to study the prophylaxis and treatment of deformities and to teach them to medical students. On the suggestion of Lange, of Munich, the following resolution was introduced:

"1. A better surgical orthopedic instruction for students is of great importance in the care of cripples.

"2. Toward this end the task of instruction in orthopedic surgery and the establishment of orthopedic polyclinics with beds is necessary in the larger universities. These clinics should be entirely independent of the surgical clinics and should possess the right of examining students."

In the course of the discussion, Lorenz mentioned that in Vienna it had already been decided to abolish the chair of orthopedic surgery as soon as he died. "Es fehlt nur noch dass sie über meine Leiche gehen."

SESSION V.

Held Sunday morning at Professor Joachimsthal's clinic. Cases and apparatus were shown.

A. E. HORWITZ, M. D.,
St. Louis, Mo.

ABSTRACTS.

ABSTRACTS DEPARTMENT.*

The following journals are being abstracted for this department:

Glasgow Med. Jour.; Edinburgh Med. Jour.; Jour. of Med. Research; Denver Med. Times; Revue d'Orth.; Archiv f. klin. Chir.; Therapie der Gegenwart; Amer. Practitioner and News; Colorado Medicine; Jour. of Exp. Medicine; St. Paul Med. Jour.; Würzburger Abhandlungen; Mitteil. a. d. Grenzgeb. d. Med. u. Chir.; Archiv. d. Ortopedia and other Italian periodicals; New York and Phil. Med. Jour.; Med. Record; Am. Medicine; French Pediatric Journals; Deutsche med. Woch.; Beiträge z. klin Chir.; Berliner klin. Woch.; v. Langenbeck's Archiv; Deutsche Zeitschr. f. Chir.; Johns Hopkins periodicals; Gaz. des hôpitaux; Arch. prov. de chir.; Annales de chir. et d'orthopédie; Presse Medicale; Zeitschr. f. orth. Chir.; Münch. med. Woch.; Annals of Surg.; Am. Jour. of Surg.; London Lancet; Brit. Med. Jour.; Practitioner; all Canadian journals; Jour. d Orth. de Bord.; Medizinische Klinik; Surg., Gyn., and Obst.; Am. Jour. of Med. Research; Journal A. M. A.; Cleveland Med. Jour.; Boston Med. and Surg. Jour.; other N. E. journals; Med. Press and Circular; Long Island Med. Jour.; Jour. Nerv. and Mental Dis.; Am. Jour. Physiology; Med. Times; American Pediatric publications; Zentralbl. f. Chir.; International Clinics; Archiv. f. Orth., Mech., u. Unfallchir.; Virchow's Archives; Präger Med. Woch.

I. TUBERCULOUS DISEASES OF THE BONES AND JOINTS.

Fistulous Tracts, Tuberculous Sinuses and Abscess Cavities. A New Method of Diagnosis and Treatment by Bismuth Paste. By Emil G. Beck, M. D., Chicago. *Journal A. M. A.*, March 14, 1908.

The writer describes a new method of treatment of fistulæ, tuberculous sinuses and abscess cavities by the injection of mixtures of bismuth subnitrate, vaselin, white wax and soft paraffin. The formulæ of the two different pastes which he uses are as follows:

℞	Bismuth subnitrate	30.00
	Vaselin,	60.00
	Mix while boiling.	

℞	Bismuth subnitrate,	30.00
	White wax,	
	Soft paraffin, āā	5.00
	Vaselin,	60.00
	Mix while boiling.	

*All important articles will be quite fully reviewed. Reports of cases and descriptions of apparatus will be indicated by title. The reviewing is not up to date for this number, but it will be the endeavor of the Editorial Committee to keep the abstracts closely abreast of the quarterly issues of the JOURNAL.

To the first when used in sinuses or cavities where mixed infection is present, he adds 1 percent of formalin.

These mixtures were first designed to be used to ascertain the extent and location of the suppurating cavities to be operated upon, by making X-ray skiagrams immediately after the injection, as the bismuth, being impermeable to the X-rays, casts a dense shadow on the plate, thus revealing the area involved.

The rapidity with which many of the cases thus injected, but not operated upon, healed up, induced him to use the method for the treatment of old tuberculous sinuses and cavities. He reports eleven cases of various kinds including psoas abscess, tuberculosis of the knee, empyema, hip disease, rectal fistula. fecal fistula following operation for appendicitis and osteomyelitis of the ulna, which healed in unusually short time after injections with the bismuth pastes. In describing the technic of the treatment, the author calls attention to the following points:

The mixtures must be injected while in a fluid state and at a temperature which will permit them to permeate every crevice and ramification of the infected tract before solidification takes place.

Care must be taken that no water gets into the mixture during the sterilization or injection of the mixture.

A glass syringe large enough to contain sufficient paste to fill the cavity and blunt enough to completely occlude the opening of the sinus should be used.

The syringe must be sterilized by dry heat and the plunger dipped into sterile oil before using.

The sinus or cavity should be dried out as thoroughly as possible with sterile gauze before injection.

The syringe should be kept hot while being filled and emptied by wrapping about it a towel or piece of gauze wrung out of hot water.

The author takes X-ray skiagrams of all cases immediately after injection. He attributes the beneficial effect of injections to the fact that the solidified paste keeps the sinuses and cavities dilated and thus prevents the oozing walls coming in contact and the maceration of the newly formed granulation tissues by heat and moisture, and to the fact that the permeable paste furnishes a bridge-work for the organization of healthy granulation tissues.

He also suggests a possible benefit from the radioactivity of the bismuth following the X-ray exposures.

In cases where sequestra are present they must be removed by operation before the injection is attempted.

The article is illustrated with skiagrams showing the extent of the cavities injected.—*John L. Porter.*

The Ambulatory Treatment of Hip Joint Disease. By E. G. Abbott, M. D., and H. M. Pingree, M. D., Portland, Me. *Journal A. M. A.*, February 8, 1908.

After discussing the principles of mechanical treatment of hip joint disease and the various methods of ambulatory treatment, the authors describe a combined plaster spica and traction-extension device which they have used in two hundred cases during the past six years. The plaster spica is put on with the patient prone in a hammock while traction is exerted longitudinally from the ankle and laterally by a bandage around the upper part of the thigh. The plaster is carried from the tenth rib to the knee with the leg in 15 degrees of abduction Adhesive straps extending from the upper part of the thigh to the ankle are applied before the spica is put on. After the spica has hardened,

a brace for making traction on the leg is attached to the lower end just above the knee. "This brace consists of a foot-piece to which is secured a windlass for regulating the amount of permanent traction.

"Welded to the foot-piece are two straps of iron which extend upward on either side of the leg. To the upper part of these irons are fastened cross-pieces of thin, flat iron which can be easily moulded. This brace after it has been bent so that it will conform to the surface of the plaster, is fastened to its lower end, just above the knee, by winding a plaster bandage around it. Traction is then applied by fastening the lower ends of the adhesive strips to the windlass below the foot.

The patient is given a pair of crutches and a lift under the well leg sufficient to allow the brace to swing free of the ground, and allowed to go about. The authors claim to have secured much better and more rapid results in their series of two hundred cases by this method than by any they had previously employed.

The article is illustrated by several photographs of various apparatus and patients.—*John L. Porter.*

Hip Joint Tuberculosis: Its Earlier Symptoms and Treatment. By Wm. Thompson Berry, B. S., M. D., Birmingham, Alabama. *Journal American Medical Association*, May 23, 1908.

The writer simply describes the classical early signs of hip disease and some of the mechanical measures used in the treatment. He lays special emphasis upon rest in bed in the treatment of abscesses.—*John L. Porter.*

Ueber Dauererfolge bei Behandlung der Fusswurzeltuberculose durch Resektion mit vorderem und hinterem Querschnitt. By E. Ochse. *Beiträge zur k. Chir.*, B. LVII, No. 2, S. 275.

A complete review of all the cases, 115 in number, operated on by this method in the Strassbourg Klinik between 1894 and 1906. The cases have been followed up, and the results carefully tabulated.—*Leonard W. Ely.*

Tuberculosis of the Patella. By John B. Murphy, M. D., *Surgery, Gynecology, and Obstetrics.*, Vol. VI, March, 1908, No. 3.

The writer reviews the literature of the subject, and reports the results of operation on two cases.

Primary focus in the patella usually develops in early adult life, and at the beginning the diagnosis is often in doubt.

The writer believes that before the operation proper, about a week or ten days, there should be a chemical inflammation set up in the knee-joint by the injection of a 2 to 5 percent solution of formalin in glycerin.

A local immunity is thereby developed.

The author, after removing the patella, uses as a substitute for it a flap of the quadriceps tendon and the vastus externus muscle brought down and sutured to the ligamentum patella.

The results are very good.—*Edward S. Hatch, New Orleans.*

The Redressement of Old Pott's Deformities. By Gaugele. *Zeit. für orth. Chir.*, XIX Band, 3. u. 4. Heft.

Description of apparatus. Patient is placed face downward on 2 padded transverse bars, one for the chest and one for the pelvis. Extension is carried out for both the head and legs. As suggested by Wullstein, the plaster is applied in 2 parts and after it sets the pressure pad is applied to the knuckle and correction is carried out, then the jacket is finished. Report of cases and their results.—*Henry O. Feiss, Cleveland, O.*

II. NONTUBERCULOUS ARTHRITIS, GOUT SYPHILIS, INFECTIOUS ARTHRITIS, ETC.

The Treatment of Joint Injuries of the Upper Arm, With Reference to the Prevention of Joint Stiffening. Geh. Medizinalrat Prof. Dr. B. Bardenheuer, *Zeit. für orth. Chir.*, XIX Band, 1. u. 2. Heft.

Joint injuries may result from contusion, distortions, partial fractures, intra or extra-articular fractures or dislocations. Each of these injuries is accompanied by a hemarthrosis. If the hemarthrosis is a large one the capsule is distended, the blood spreads in the folds of the synovial membrane, fibrin is deposited in these folds leading to gluing and adhesion, which under stress of later movements tear, calling forth new hemorrhages. To promote resorption nothing is more effective than active movements combined with extension. Active movement is better than passive, because it can be applied to the limits of painlessness and thus causes no further injury. As a result of joint injuries, we have to fear: First, ankylosis. To combat this, all the tissues must be stretched from time to time. Secondly, we have to fear primary joint inflammations in connection with fractures, tending to ankylosis. Extension is the special means of preventing this. Thirdly, we must fear secondary synovitis and parasynovitis. Fourthly, we must fear inhibition of joint movement caused by spreading of the callus. In dislocation we have less reason to fear ankylosis. Author gives several examples of such injuries of the upper arm and describes in specific detail how they are treated. —*Henry O. Feiss, Cleveland, O.*

Hypertrophy of the Synovial Fringes of the Knee Joint. By Edwin Gerhardt Abbott, M. D., Portland, Maine. *Journal American Medical Association*, May 23, 1908.

After discussing the clinical differences between this condition and various others that are confounded with it, as lipoma arborescens, loose cartilage, etc., and the disability which often follows the usual operations for these conditions, the author describes a new operation which he has employed with good results. An incision two inches long is made on each side of the patella-tendon down to the capsule. The tissues are separated from the capsule so that the sides of the wound can be widely retracted. The capsule is then picked up in the center of the exposed space with a volsellum forcep and lifted away from the joint. Then with a long-jawed forcep specially devised for the operation a fold of the capsule is clamped, care being taken to engage as much of the loose capsule as possible. A row of sutures is then placed in the capsule going through both capsule and synovial membranes in such a way as to tighten the capsule and pull to one side the enlarged synovial fringes which lie under the patella. Then the fold of capsule held by the clamp is cut off between the clamp and the sutures, leaving a raw edge of capsule and synovial membrane. A row of fine sutures pulls the edges of the capsule together burying the synovial edges. By doing this on each side of the joint, the lateral fringes which have become hypertrophied are pulled to one side from under the patella. The skin wounds are then closed and a splint applied which holds the knee extended for about a week. After its removal motion is begun and in a few days the joint is practically normal. The author's idea is to avoid the adhesions and scar tissue which results in limitation of motion and prolongs the after-treatment.—*John L. Porter.*

A Case of Osteochondritis and Dactylitis Luetica Hereditaria. Tschierniawski, St. Petersburg. *Zeit. f. orth. Chir.*, XVI Bd., 3–4 Heft.

Clinical Contribution to the Syphylitic Arthropathies. By Marino. *Il Policlinico*, 1907, *sez. chir.*, Vol. XIV, No. 1, p. 1.

Marino reports two cases of involvement of the elbow-joints. In the first, a man of 26, with a history of infection at 16, there had been a swollen condition of the right elbow of three years' duration, following shortly after a slight injury to elbow. There was almost complete limitation of motion and much pain, especially at night, some muscle atrophy, general polyadenitis, and fluctation. Aspiration removed 20 c.c. of serosanguinous fluid. Under mercurial injections the pain rapidly disappeared and after two months there was normal function of the elbow.

In the second, a man of 24, with history of infection two years previous, there was a history of a swelling of the left elbow, without preceding trauma, of 1 month's duration, with much pain. Here, too, there was swelling, fluctuation, loss of function, and much pain. There was also a polyadenitis. Complete recovery followed one month of the iodide-mercurial treatment.

He emphasiszes the point that in both these cases there was marked limitation of motion and severe pain, and disagrees with Mericamp and others that lack of these two symptoms to great degree aids materially in a differential diagnosis from tuberculosis, believing that usually the diagnosis must be made from the results of specific treatment. He considers the first case to be an example of involvement of the osseous tissues themselves, and the second to be an example of localization in the perisynovial tissues only.—*William G. Erving, Washington.*

Pre-tabetic Bone and Joint Lesions. By J. Stefani. *Gaz. des Hôp.*, 1908, No. 23.

Several cases are reported in detail. The lesions of the bones or joints preceded by a considerable period, of months or years, the appearance of any features pathognomonic of tabes. Of such lesions three groups are to be recognized: a purely osseous, a purely articular, and a mixed variety. The purely osseous group comprises lesions of two characters: first, spontaneous fractures; secondly, a rare form of osteitis, especially in the small bones of the extremities, simulating *spina ventosa* (a hitherto undescribed form, the author believes). The *second group* comprises only arthropathies—"Charcot's joints." In the *third group*, that most often seen, spontaneous fractures and arthropathies coexist. Among the early diagnostic signs of tabes the one most to be relied on is inequality of the pupils; next, the Argyll-Robertson pupil. In these cases, therefore, total absence of the cardinal signs of tabes does not necessarily exclude it as the causal factor, as subsequent developments may show. *Roades Fayerweather, Baltimore.*

Subacute Arthritis of Hip Occuring in Case of Chorea with Heart Lesion. By M. A. Broca. *Gaz. des Hôpitaux*, 1907, No. 139.

III. SCOLIOSIS. TORTICOLLIS AND OTHER DEFORMITIES OF THE TRUNK.

On the So-called Concave Torsion of the Spinal Columns. By Dr. W. Schulthess-Zurich. *Zeit für orth. Chir.*, XIX Band, 1. u. 2. Heft

Author makes the following experiment: A human spinal column is grasped by clamps at its upper and lower ends, so that each of these points of attachment is movable on a frontal, sagittal and vertical axis, which can be regulated so that the separate axes can be manipulated by themselves. The upper end is then weighted. The experiment shows the following re-

sults: First, with all axes free and weight of 20 kg. and with the column placed in its usual physiological form with respect to physiological curves, both left and right concave total curves were produced; in both cases there took place a concave-sided rotation of the upper end of about 30 degrees. Second, with backward bend of the cervical spine, forward bend of the sacrum and maintenance of these bends, the column becomes relatively lordotic on weight-bearing; that is, it extends itself in the dorsal part. With side bend there develops a rotation of the upper clamp toward the concave side. Third, if the lower end of the column is free on the frontal axis, and the upper end is freed on rotatory and sagittal axes, then in side bending we find a concave-sided rotation of the upper end. Fourth, the lower end turns toward the concave side under the following arrangement, viz., with all axes free and the upper end bent backward and fixed. Fifth, in several other experiments with the freeing of the sagittal axis and the lower rotation axis there is a distinct rotation of the lower end. These experiments show very distinctly that, with bending under definite mechanical conditions in a given direction, rotation will take place in the upper and lower end toward the concave side. The conclusion is that concave-sided torsion of the ends of the column is natural in the human being.—*Henry O. Feiss, Cleveland, Ohio.*

On Concave Torsion. By Prof. Dr. A. Lorenz. *Zeit. für orth. Chir.*, XIX Band, 1. u. 2. Heft.

Left convex scoliosis with concave torsion is a frequent form of beginning scoliosis, for which explanations up to the present are not satisfactory. Special reference to Schulthess and Lovett. Studies of the author on the anatomical preparation and living model show that side inflexion of the column is always accompanied by convex torsion. But rotation in a given segment of the column on its medial axis in any attitude engenders the appearance of convave rotation. As the direction of a lateral curve is determined by the bodies and not by the spinous processes and as the rib prominence is only the anatomical expression of the divergence of the bodies on that side, we must assume a similarly directed divergence of vertebral bodies corresponding to the maximum rib deformity, even in case the line of connecting spinous processes presents the opposite convexity. In the left convex total scoliosis concave torsion can only be referred to in a clinical sense because clinical observation does not tell us definitely the direction of the bodies, but even the clinical concave torsion is only an apparent one, for it never corresponds to the apical point of the left convex total line of spinous processes. Anatomically, there is no concave torsion, for never do the vertebral bodies rotate into the concavity of the maximum region of the curve. The so-called transformation of a total scoliosis with concave torsion to a compound scoliosis is nothing more than the development of a lesser to a higher grade of deviation of the same character if we regard double and triple curves as taking place originally. Left convex scoliosis with concave torsion is, therefore, not a real scoliosis as it has been designated, but only an apparent scoliosis. On the other hand, left convex scoliosis with lumbo-dorsal convex torsion which is designated as an apparent total scoliosis, becomes a real one, but total only in so far as that is possible, for even in such cases must the upper and lower compensatory curves be present in a certain measure. It is, therefore, impregnably to be maintained that the bodies of the vertebræ must under all circumstances turn to the convex side in lateral inflection of the column, and that convex torsion alone exists.—*Henry O. Feiss, Cleveland, Ohio.*

Study of the Position of the Sternum in Scoliosis. By Fauconnet. *Zeit. für orth. Chir.*, Band. XVII.

Important conclusions: (1) In left convex forms there is a tendency for the sternum to go to the side of the convexity and for its lower end to be diverted toward the same side, not merely with reference to the sagittal plane of the sacrum, but also with reference to the dorsal part of the column. (2) Observations in right scoliosis show a tendency for its location to be either on the concave side or on the convex side, but there is a distinct tendency for the lower end to be diverted toward the convex side, but only with reference to the sagittal plane of the sacrum and the reverse with reference to the dorsal column.

Author deduces that a given type of scoliosis has the tendency to always cause a given location for the sternum. He finds that the deviation of the upper four or five dorsal vertebræ has a very important influence on the sternum, due apparently to the fact of the more intimate rib connection of those particular vertebræ to the sternum.—*Henry O. Feiss, Cleveland, Ohio.*

Scoliosis with Infantile Paralysis. By Ewald. *Zeit. für orth. Chir.*, XIX Band, 3. u. 4. Heft.

Author takes advantage of the rare opportunity offered, namely, that of an autopsy upon a case of scoliosis from infantile paralysis. Detailed description of case with special reference to the musculature. Case presents a total left convex curve in the spinal column with contraction of the left chest. Muscles paralyzed in the trunk were: (1) semi-spinalis dorsi; (2) multifidus, except for the neck part; (3) rotatores, interspinales, intertransversarii, all on the left side. The questions which present themselves are: Is the paralyzed muscle the true cause of the deformity? May we assume that on account of the deficient function of muscles on the left side, the opposite side contracts producing a curve with a convexity pointing to the diseased side and also causing the rotation of the bodies toward the left? Must this pathological attitude eventually lead to fixation? Author believes that the above questions may be answered in the affirmative.

In spite of the paralysis of the right leg in this case, we have not to do with a static scoliosis because on account of the severity of the paralysis the patient could neither stand nor walk, thus ruling out all static forces which could in themselves lead to scoliosis. A review of the literature and a discussion.—*Henry O. Feiss, Cleveland, Ohio.*

Pendulum Apparatus for the Treatment of Deformities of the Cervical Spine. By Codivilla. *Zeit. für orth. Chir.*, Band XVII.

The apparatus enables every manipulation of the head and neck, at the same time supporting the same. It regulates the direction, the kind, the amplitude, and the strength. With the help of this apparatus the exercise can be accurately prescribed. Description of the machine.—*Henry O. Feiss, Cleveland, Ohio.*

Scoliosis Treatment at Home. By Gerson. *Zeit. für orth. Chir.*, XX Band.

Author describes a simple method which can be carried out conveniently at the home of the patient for the treatment of the less severe cases of scoliosis. The method consists of certain exercises and in directing the patient to take recumbent positions according to certain rules.—*Henry O. Feiss, Cleveland, Ohio.*

Anatomic Investigations on the Connection Between Cervical Ribs and Scoliosis. By Eckstein. *Zeit. für orth., Chir,*, XX Band.

Thirty-five museum specimens from the German Anatomical Institute at Prague were studied. Twenty-four bilateral cervical ribs, 11 unilateral. Of the 35 cases, 22 corresponded to the type earlier described by Garré and Helbing, and in spite of that had no signs of scoliosis. Author comes to the unavoidable conclusion that cervical ribs alone are not the cause of the formation of the severe cervico-dorsal scoliosis, but that other etiologic factors, such as rickets, heredity, malformation, etc., must be considered.—*Henry O. Feiss, Cleveland, Ohio.*

Ein Skolioseapparat. By Dr. Max Wunsch. *Deutsche med. Woch.*, 1907, No. 40, S. 1637.

The apparatus consists of a pelvic girdle and shoulder-pieces, and evidently relies for its efficacy on the old theory of "unwinding" the curve by a pull on the shoulder from a fixed point on the pelvis. It bears a great resemblance to the contrivances seen in the usual instrument makers' catalogue.

The Operative Treatment of Muscular Torticollis. By Haudek. *Zeit. für orth. Chir.*, XX Band.

Author embraces the method suggested by Lange, namely, the division of the sterno-cleido at its insertion in the mastoid process. The advantage of the method, as stated by Lange, is that the scar can be kept out of sight. After the operation he uses wadding bandages after the manner of Schanz.—*Henry O. Feiss, Cleveland, Ohio.*

Ein Apparat Gegen Schiefhals. By Dr. Max Wunsch. *Deutsche med. Woch.*, 1907, No. 27, S. 1094.

In this apparatus a band encircling the head is held in place by another passing over the vertex. On the side of the circular band opposite the diseased muscle is attached a curved rod that passes down behind the neck to the shoulder in the affected side. One-third of the way down this rod, another band starts which, passing down behind the sound shoulder, under the axilla, over the shoulder, across the back, under the other axilla and then over that shoulder, is attached to the lower end of the rod.

IV. DISLOCATIONS AND FRACTURES.

Contribution to the Study of Congenital Dislocation of the Hip.—Bade. *Zeit. für orth. Chir.*, XX Band.

Author demonstrated a case of bilateral dislocation which was diagnosed and reduced two days after birth. He says that if every physician examined the hip-joints of every new-born and, if there was any doubt, called in the orthopedist or used the Roentgen ray, that he could then save many a case of congenital limp from such disability before the child had made its first step. Author also reports a case of bilateral dislocation of the hip complicated by bilateral club-foot. Complete cure. Thirdly, report of a case of congenital or paralytic luxation of the hip, in which the patient showed power for reducing it himself.—*Henry O. Feiss, Cleveland, O.*

Our Experience with Congenital Dislocations of the Hip.—Ehebald. *Zeit. für orth. Chir.*, XX Band.

The observations cover 152 cases. Author discusses the etiology, pathologic anatomy, anamnesis, symptoms, diagnosis, complications, treatment, the

maintenance of position, the open operation and the results. These results are as follows: 102 cases were reduced, 67 unilateral, 35 bilateral. Three of the former were reduced by the open method, 7 are yet under treatment. Of the remaining 57 cases. 32 had a perfect anatomical result. In 15 there was eccentric reduction, but 12 of these showed functional results, 6 were transpositions. Twice there was fracture of the hip. Of the 35 bilateral, 5 are still under treatment. In 5 cases, only one side was reduced and 2 cases were treated by the open method. Of the remaining 23 cases there were 7 anatomical results, 1 anatomical result with stiffening of one side, and an eccentric reduction with good function of both sides. In 2 cases there were anatomical results on one side and eccentric on the other. Three cases showed eccentric reduction with transpositions and 3 cases showed transposition on both sides. Of 4 other cases there were good results on one side and open operations had to be done on the other.—*Henry O. Feiss, Cleveland, O.*

On the Etiology of the Congenital Dislocation of the Hip. Graetzer. *Zeit. für orth. Chir.*, XX Band.

Author refers to preparations of the new-born who, aside from the luxation upward, also present a nearthrosis above the original socket. These congenital nearthroses not only point to an intrauterine completion of the primary luxation upward, but also make it possible for us to understand certain rare cases in which upward dislocation persists.—*Henry O. Feiss, Cleveland, O.*

Compensatory Dislocation of the Hip. Becker. *Zeit. für orth. Chir.*, XX Band.

The record of a case in which, on account of contracture in the one hip in a severely adducted position following hip disease, the other one was forced into a similar adduction in order to enable walking. The operative interference consists of an oblique subtrochanteric osteotomy of the originally affected hip and a division on both sides subcutaneously of the contracted soft parts.—*Henry O. Feiss, Cleveland, O.*

The Open Reposition of Congenital Dislocation of the Hip.—Deutschlander. *Zeit. für orth. Chir.*, XX Band.

Author used the typical incision of Hoffa along the tensor fasciæ latæ followed by a blunt dissection through the fibres of the gluteus medius. Anterior and upper parts of the neck of the femur exposed and laid bare. The first difficulty arises in the mobilization of the upper end of the femur. This seems to be chiefly due to the fibrous thickening involving the capsule. Following the freeing of the head, one turns to the exposure of the primary socket. Careful account given as to method of procedure. Having found this primary socket, it has to be deepened. The modeling of the acetabulum having been finished, there follows the act of reposition. After reposition one must test the stability of the head. This is essential because there are no soft parts above to hold it in place. In putting on the plaster the position maintained is moderate abduction and much inward rotation, this being the position of greatest stability. In order to insure fixation the plaster includes the lower leg and the thigh of the healthy side. Windows are made to provide for the dressing. He tries to begin massage and passive motion at the end of 3 weeks. The correct after-treatment has for its aim a movable joint, and if anchylosis results, it is often on account of the

neglect of this after-treatment. Author describes 10 cases. Of the 10, he got good motion and good function in 5. In one of these, he enlarged the acetabulum too much, thus allowing a little shortening. In 4 cases the result was faulty because of anchylosis. In 3 of these the anchylosis was in good position; in another, on account of insufficient after-treatment, there was some flexion and adduction. In one case there was pus formation; another one died.

Author's chief desire is to incite others to further testing the operation. He cited his personal mishaps in order that others may profit thereby, and has carefully reviewed the impediments of the operation and its difficulties, hoping thereby that these will decrease with the perfection of technic and the growth of experience.—*Henry O. Feiss, Cleveland, O.*

Further Contribution on the Bloodless Treatment of Congenital Dislocation of the Hip.—By G. Drehman. *Zeit. für orth. Chir.*, XX Band.

Author cites his previous experience and the present article reviews results from his private practice.

Critic of Bloodless Methods.—There are two distinct methods: 1st, the gradual method of reduction and, 2d, the forcible method. The former is the old-fashioned treatment, the second is that instituted by Paci and Lorenz.

Statistics and Etiology.—Author has used the forcible method on 166 cases. Complications rare.

Cases of Self-correction.—Author cites cases in which the evidence is clear that they were cured with very little treatment.

First Indication and the Best Stage for Reposition.—Usually parents note the trouble in the second half of the second year. Author likes to begin treatment at the end of the second year.

Causes of mishaps are: primary—poor fixation, too much stretching of soft parts, incomplete reposition, the incarceration of capsule, poor position; secondary—changing the angle without turning the knee, poor technic, poor plaster casts, too early corrective from the primary position, too violent corrective, anatomical causes.

Accidents mentioned: Fracture, hernias, hematoma, paralyses.

Method of Reduction.—Author first attempts reduction without stretching the adductors, the leg bent at knee and placed at right-angle flexion at the hip. Inward rotation then carried out dependent on the amount of antiversion. In this position, pressure on trochanter brings head directly over the edge of socket. This maneuver is sufficient for 2 or 3-year-old children. In older children, the soft parts are first stretched, but not too much as they serve to hold the head in the socket. Plasters applied with thigh in right-angle abduction.

The Healing Process.—According to autopsies, this is due to the contraction of the capsule. According to Roentgen pictures, there takes place a deposition of bone along the edge of the socket. Of 141 cases under 10 years old, 9 are still under treatment. Of the 104 unilateral, there were 94 anatomical results and 3 are eccentrically placed in normal sockets. Seven of the others have good functions. Of 28 bilateral, there were 20 anatomical results.

Conclusions.—The bloodless method has come to stay. All cases are curable if they are seen early enough. In bilateral cases, every month after the end of the second year adds to the difficulty. A table of results is appended.—*Henry O. Feiss, Cleveland, Ohio.*

Experimental and Congenital Hip Luxations. By Ghillini. *Zeit. für orth. Chir.*, XIX Band, 3. u. 4. Heft.

Author mated dogs in which he had luxated the hip. The results were negative in the offspring and yet significant for the pathologic anatomy of the deformity thus brought about in the parents. In 8 dogs, 3 showed triangular acetabula. The surface of the acetabulum was sometimes smooth and sometimes presented inequalities without cartilage. It also showed proliferation of bone substance in its concavity. The upper ends of the femora were atrophic. In all but 2 cases the head of the bone was depressed, and in these 2 exceptions it was elevated. Antiversion of the neck had taken place in all. Author believes that his results are evidence in support of the mechanical theory of the development of dislocation of the hip because the pathologic anatomy is so similar.—*Henry O. Feiss, Cleveland, O.*

Die Theorien der verschiedenen Mechanismen der Lunatumluxation. By George Montadon. *Beit. z. k. Chir.*, Band LVII, No. 1, S. 9.

The author, after going carefully into the mechanics of this injury, sums up as follows:

1. Dislocation is almost always volar. Dorsal dislocations are seldom seen.
2. Volar luxations are caused by superextension of the wrist, less often by superflexion.

In regard to therapy he divides the subject into three parts, and advises:

1. With a compound dislocation, removal of the bone.
2. With recent simple dislocation, attempt at reposition by traction and superextension, palmar pressure over the semilunar, and then flexion.
3. When the attempt at reposition fails, or in an old complicated case, expectant treatment if the discomfort is not great, otherwise removal of the bone. Recent writers favor the latter.

An extensive bibliography accompanies the article.—*Leonard W. Ely.*

The Technic of Reduction of Congenital Dislocation of the Hip (Reduction des Luxations Congenitales). By Paul-Vital Badin, Paris, 1908. Pp. 164.

This monograph is divided into two parts. In the first part, the pathologic anatomy and symptomatology are discussed. The second part deals with the manner of reduction, the bloodless method being adopted.

According to the method set forth, there are 6 steps: 1st, Fixation of pelvis. 2d, Mobilization, bringing down femoral head. 3d, Elongation of the adductors and flexors of hip and knee. 4th, Reduction. 5th, Preparation of acetabulum, distension of capsule, elongation of retracted muscles. 6th, Immobilization. In the actual reduction the posterior method is used. In the immobilization the attitude preferred is abduction with flexion. The author lays stress on the necessity of using the least possible violence, as the final result depends to a great extent on the integrity of the muscles.

The work is based on a rather large experience gained in Redard's Clinic, and deserves special attention on account of its clearness and practicability.—*Henry O. Feiss, Cleveland, O.*

The Adhesive Plaster Dressing in the Treatment of Congenital Clubfoot. By Ritschl. *Zentralbl. f. chir. u. mech. Orth.* November, 1907.

While recognizing plaster of Paris as the most certain method of fixation, R. recommends adhesive plaster for certain cases. A broad strip of plaster is applied to the dorsum of the foot, carried around the inner border, under

the sole and up the outer side of the leg, where it is attached after securing the desired amount of pronation; a second or a third strip may be used. Author has found it a useful method for holding the foot in the desired position during the application of a plaster bandage.—*David Silver, Pittsburgh.*

The Thickening of the Body of the Astragulus as the Cause of Recurrence in Club-foot. By Lehr. *Zeit. für orth. Chir.*, XX Band.

Author refers to a typical manifestation in that the astragulus is so thick with respect to the intramalleolar interspace that it cannot find room there. Description of the foot. Author recommends the operative reduction of size of the bone by an open method. The lengthening of the tendo achillis is not usually necessary as the equinus is usually due to bony obstruction.—*Henry O. Feiss, Cleveland, O.*

Etiology and Pathology of Club-hand and Club-foot. Hohman. *Zeit. für orth. Chir.*, XIX Band, 3. u. 4. Heft.

Observations made on 4 cases. With reference to etiology, there are 3 theories—the neurogenous theory, the mechanical theory and the theory of faulty layers of the embryo. The author's observations seem to point to the mechanical theory, the proximate cause being the contraction of space in the uterus. Following are the arguments: 1, None of his cases furnish evidence pointing to the neurogenous or embryonic theories; 2, in two of his cases there was diminution of embryonic fluid and breech presentations; 3, the fact that analogous deformities (club-hand and club-foot) occurred at the same time; 4, the tendency in his cases to reassume the intrauterine position after birth; 5, the other pathological changes which could only depend upon position, such as luxation of the hips, contractures, etc.

Supplement: Two other cases reported strengthening his point of view.—*Henry O. Feiss, Cleveland, O.*

A New Operation for the Cure of Club-foot. By Peter Bade *Wiener med. Wchn.* No. 22, 1907.

Late cases are usually very resistant to the ordinary methods of overcorrection, and for their relief a large number of ingenious operations have been devised of which the author gives a short description. Some attack the soft parts and others the bones.

The shortcomings of the pure modeling redressment has always been that in very resistant cases the soft parts over the dorsum of the foot, etc., receive so much damage from the wedge, wrench, osteoclast or other instrument used that it becomes necrotic. Bade describes an operation and instrument to enable one to use the maximum of force upon the bones without damaging the soft parts. The special instrument is of the nature of a long chisel with the edge very blunt and well rounded off.

The incision is made over the most prominent part of the dorsum, the periosteum is incised and pushed aside and the rounded edge of the instrument inserted. The inner edge of the foot is supported by two sandbags; the instrument is firmly grasped by the hand and pressure is made directly downward upon the bones so as to break the foot in two at the middle. Plantar fasciotomy is performed. If the hand cannot exert enough pressure to overcome the deformity, a hammer is to be used. There is little danger of doing much damage. When the adduction of the tarsus and metatarsus

is thoroughly overcorrected, the wound is sewed up and the usual tenotomies performed, and after a thorough manual overcorrection of the entire foot it is encased in plaster

The advantage of this operation is maximum overcorrecting force with minimum damage to soft parts.—*Walter G. Stern, Cleveland, O.*

Case Report on Metatarsus-Varus-Congenitus. By Hirsch. *Zeit. für orth. Chir.*, XIX Band, 3. u. 4. Heft.

Report of a case. The striking point in the Roentgen picture is the massiveness of the posterior part of the foot compared with that of the middle part. Whereas, normally the scaphoid bone completely overspreads the head of the astragulus anteriorly, the luxation is so marked here that on the left fully ½ inch of the articular surface of the head of the astragulus lies free, and on the right ¼ inch, so that the head of the astragulus projects inward further than the tubercle of the scaphoid.—*Henry O. Feiss, Cleveland, O.*

A Case of Congenital Dislocation of the Knee, with Absence of the Patella. By Kofman. *Arch. f. Orthop.*, Band. VI, H. 1.

The patella was absent, the condyle of the femur filled up the popliteal space, rendering it convex instead of concave. Flexion of the knee was made impossible by shortening the ligament of the quadriceps extensor.

The operative treatment consisted in lengthening the tendon of the quadriceps and the making of an artificial patella from a piece of the tibia.—*Walter G. Stern, Cleveland, O.*

Contribution to the Surgical Treatment of Congenital Anterior Luxation of the Radius. (Contributo alla cura chivurgica della lussazione anteriore congenita del radio.) By R. Galeazzi. *Archivio di Ortopedia.* 1907. P. 232.

There are 21 cases of congenital luxation of the radius in the literature of which 12 were bilateral. Three were treated by resection, but all with unsatisfactory functional results. The present case was a boy aged 14 years with bilateral luxation with marked disability. The forearms were held in a permanent position of semipronation with limited movements of supination and flexion. The flexion was much reduced on the left side and almost abolished on the right. In operating, the pronator muscle was first loosened from the radius and the biceps tendon lengthened. It was also necessary to incise the interosseous membrane for a considerable distance. On account of the increased length of the radius, it was necessary to cut away considerable of the external condyle in order to make a suitable place for the radial head which was fixed in place along with its orbicular ligament by means of silkworm gut. The right arm was fixed in flexion to guard against reluxation. There was no such tendency shown by the left elbow. About two years have elapsed and both arms have excellent functional results.—*Gwilym G. Davis, Philadelphia.*

A Case of Congenital Luxation of the Humerus. By Zander. *Zeit. für orth. Chir.*, XX Band.

Case report with stereoscopic pictures which aim to show the exact relations of this deformity. In the same case there was a congenital elevation of the scapula.—*Henry O. Feiss, Cleveland, O.*

Treatment of Dislocation of the Shoulder Joint Complicated by Fracture of the Upper Extremity of the Humerus. By J. M. Mason. *Annals of Surgery*, May, 1908.

From an analysis of 63 cases of shoulder dislocation complicated by fracture of either the anatomical or surgical neck of the humerus, the author concludes that in treating such an injury the surgeon should first make gentle efforts at reduction, after which, if successful, he may treat the fracture. If, however, this procedure is not successful, he advises immediate arthrotomy with reduction of the dislocation, followed by suture of the fragments or immobilization of the fracture. He condemns the method of attempting to reduce the dislocation by the use of hooks instead of resorting to open arthrotomy. He considers arthrotomy and reduction superior to resection.

From an analysis of 21 cases of dislocation with fracture of the greater tuberosity of the humerus, he advises an immediate attempt at reduction by manipulation, followed by immediate nailing of the fragment to prevent its reattachment in an abnormal position or its being drawn into the joint. If this is unsuccessful, he recommends immediate arthrotomy, reduction, and nailing, or removal, of the fragments.—*C. W. Hoyt, Rochester, N. Y.*

Traumatic Subluxation of the Humerus. By Frank P. Vale. *Annals of Surgery*, May, 1908.

The author reviews the literature of subluxation of the humerus, and reports a case of disability of the shoulder following a fall upon the outstretched hand, the disability being manifested by absence of power to raise the arm above the horizontal. In making the diagnosis the author lays stress upon the slight anterior prominence and posterior flatness of the shoulder, and the fact of its being held on a higher level than the uninjured shoulder, this being most easily recognized when both arms were held out horizontally. Absence of bony injury must, of course, be established in all cases by an X-ray.—*C. W. Hoyt, Rochester, N. Y.*

A Treatment of Epiphyseal Displacements and Fractures of the Upper Extremity of the Humerus, Designed to Assure Definite Adjustment and Fixation of the Fragments. By Royal Whitman. *Annals of Surgery*, May, 1908.

For such injuries the author recommends the bringing together of the fragments by a method similar to that used in corresponding hip fractures, namely, putting up the arm in extension, abduction and elevation, and holding for several weeks by a shoulder spica reaching to the wrist.—*C. W Hoyt, Rochester, N. Y.*

Fracture Through the Anatomical Neck of the Humerus with Dislocations of the Head. By John J. Buchanan. *Annals of Surgery*, May, 1908.

The author reports one case of such injury, and analyzes the literature of 22 cases. The cause, he states, is invariably a fall; the pathological conditions is dislocation, and pressure of the anatomical neck against the lower anterior border of the glenoid. For treatment he recommends first a gentle attempt at reduction of the dislocation by manipulation, followed by the usual treatment of the fracture. If this is unsuccessful, he advises incision, by which method he thinks the head of the humerus may sometimes be replaced, but usually it will have to be excised.—*C. W. Hoyt, Rochester, N. Y.*

Tarsal Injuries. By J. G. W. Knowlton, *Boston M. & S. J.*, Nov. 7, 1907. Reports two cases of simple fracture of os calcis and two of astragalus. Comments upon the difficulty of diagnosis, and advises X-ray in all cases where any doubt exists. Recommends motion (not stating whether active or passive) every second day, after the first week.—*E. W. Ryerson, Chicago.*

The Open Method in the Treatment of Pott's Fracture of the Leg. By Horner H. Heath, M. D., and Clarence D. Selby, M. D., of Toledo, Ohio. *Annals of Surgery*, January, 1908.

The writers advocate early operation for all cases of Pott's fracture. With this method they claim a great diminution in the amount of pain, quick recovery with the parts in good position, and freedom from flat-foot which so often follows this injury.—*Ralph R. Fitch, Rochester, N. Y.*

Simple Fracture of the Carpal Scaphoid. By William A. Downes' M. D., of New York. *Annals of Surgery*, January, 1908.

Seven cases of this fracture are reported. Emphasis is placed upon the importance of an X-ray examination, and upon early immobilization of the wrist with the fragments in good position. Removal of a portion of the bone is sometimes necessary when there is much displacement.—*Ralph R. Fitch, Rochester, N. Y.*

Fracture of Stieda's Process of the Astragalus. By Ebbinghaus. *Zeit. für orth. Chir.*, XX Band.

Stieda's process is in the posterior external inferior corner of the astragalus. Just as typical fractures follow forcible pronation, supination and dorsal flexion, so does a typical fracture follow forcible plantar flexion. This type pertains to Stieda's process.

In the symptoms an important point is that the localized tenderness occurs almost in the middle between the inner malleolus and the insertion of the tendo achillis. Besides, we find the other symptoms of ordinary fracture with crepitation and ecchymosis. Diagnosis is to be confirmed by the Roentgen ray.—*Henry O. Feiss, Cleveland, O.*

The Production of Typical Injuries in the Carpal Bones and in the Radius by Indirect Means on the Cadaver, and Manner in which They Take Place as Studied in the Light of the Mechanism of the Movements of the Joints of the Hands. By Lilienfeld. *Zeit. für orth. Chir.*, XX Band.

Title explains itself. The author demonstrated fractures of the radius, of the carpus, isolated fractures of the scaphoid and of the os hamatum. In fractures of the radius he notes that the direction of force determines the overriding of the broken ends. In isolated fractures of the scaphoid he finds that the arm is placed in radial abduction and dorsal flexion and the patient falls with the lower arm pronated upon the radial part of the surface of the hand. For further details see original article. *Henry O. Feiss, Cleveland, O.*

On Diagnosis of Accidental Lesions Occurring about the Elbow-joint in Children. By Bocker. *Zeit. für orth. Chir.*, XX Band.

For correct diagnosis we must be acquainted with the normal anatomy during the period of development, and the pathologic anatomy of fractures as recognizable in Roentgen pictures. We must take pictures from two points of view in difficult cases, and we must have for comparison a picture of the

healthy side. Finally, we must consider the clinical examination in connection with the Roentgen findings.—*Henry O. Feiss, Cleveland, O.*

Isolated Fracture of the Pisiform Bone. By Alsberg. *Zeit. für orth Chir.* XX Band.

Author reports a case which he states is the first one in literature, so far as he can ascertain.—*Henry O. Feiss, Cleveland, O.*

Observations on the Treatment of Fracture of the Neck of the Femur in 112 Cases. By John B. Walker, M. D., of New York. *Annals of Surgery*, January, 1908.

The writer, considering the unfavorable outcome of the great majority of cases of fracture of the neck of the femur treated by extension, advises the use of the plaster-of-Paris spica in such cases and points out the advantages of this method. He also recommends the extension method of Bardenheuer when such treatment can be carried out.—*R. R. Fitch, Rochester, N. Y.*

On the Use of Massage and Movement in the Treatment of Fractures. By Cathcart. *Glasgow Med. Jour.*, July, 1907.

The author directs his attention to the massage and movement method of treating fractures, and shows how almost every fracture in the body can have this method applied to it with much benefit to the patient. He arrives at the following conclusions after a study of the literature and reviewing his personal experience. Absolute immobility of the broken ends of bone is not essential to bony union. The ribs unite in spite of the movements of respiration, and wide experience has shown that the slight amount of movement necessarily involved in the daily massage of a fractured limb and in the daily active and passive movements, for a few minutes at least, of the adjacent joints, seems to hasten rather than hinder the formation and the solidification of the callus. Extravasated blood in joints and among muscles and synovial sheaths leads to adhesions in its neighborhood, as if it were in itself a source of irritation, apart from the irritation due to bruising and laceration of these soft parts which accompanies fracture. Massage in the form of stroking and gentle kneading and with it occasional movements are in several ways beneficial in the treatment of fracture. These measures not only aid the actual union of the bones, but help in the absorption of effused blood and serum, restrain if not prevent the formation of adhesions among the soft parts, and maintain the nutrition of the muscles. They, therefore, simultaneously hasten union and prepare the limb to return to functional use almost as soon as the bones are united. Splints and other retentive apparatus, including extension, are required more to prevent malunion than non-union, and hence are called for, especially where the weight of the limb or muscular action are likely to lead to bad position during the healing. Anyone sufficiently careful and gentle in handling an injured and delicate part can do this massage and manipulation. The objects of which are in recent fracture to diminish the swelling, allay muscular spasm and soothe pain, in later stages to stimulate circulation, disperse accumulations of blood and serum and maintain nutrition of muscles, nerves and soft parts. The patient must not be caused pain. The author then give directions for the treatment of special fractures and calls attention to the fact that splints and extension must be employed meanwhile to supply the rest and fixation necessary. In certain fractures, as that of the clavicle, none of the appliances so far used prevent a certain amount of overriding; a good functional

result is here obtained by the use of a simple sling with the arm firmly supported at the side. Simplification of apparatus is a desirable thing, and the writer is of the opinion that much can be accomplished in this direction.—*Nathaniel Allison, St. Louis.*

The Fundamental Relation between the Os Tibiale and Fractures of the Scaphoid Bone in Flat-foot. *Zeit. für orth. Chir.*, XIX Band, 3. u. 4. Heft.

Author repudiates Haglund's cases, but the presence of the os tibiale might under certain conditions cause symptoms, localized in that region, because in such cases the more exposed position of the projection is liable to irritation from shoes. Further critic of the discussion between Haglund and Lilienfeld.

Supplement.—Author had previously stated that the os tibiale always had sharp and round contours, but states that he recently saw a case where the bone actually looks like a broken piece of the scaphoid. This does not strengthen Haglund's argument, because the same condition appeared on the other foot where there were no symptoms.—*Henry O. Feiss, Cleveland, O.*

On the use of Immediate Massage in the Treatment of Fractures. By A. Guarnieri. *Archivio di Ortopedia.* 1907. P. 97.

The author claims that the use of massage in the treatment of fractures is not sufficiently appreciated. He advocates it especially in fractures in the vicinity of joints, fractures of the radius, Colles' fracture of both bones of the forearm, intramalleolar and supramalleolar fractures of the ankle, also of the elbow and shoulders. To a less extent it is applicable to those of the knee and neck of the femur and of the diaphysis of long bones where there is great tendency to displacement. Provisional splints are to be employed for a short time which are to be removed each time the massage is applied. In the beginning only the lightest manipulations are to be employed with vaselin or other fatty substance. While Championniére advised that the massage should not be prolonged beyond a half-hour, the author advises one or even two hours distributed, if necessary, at intervals during the day. He allows the patients with fractures of the upper extremity to get around a few days after the injury and in fractures of the leg about the 30th day. He begins slight passive movements almost from the time of reception of the injury. He also advises the use of warm baths and electricity prudently administered. It is not a method to be left to the laity or nurses, because it demands the greatest discernment and skill, but applied correctly, it is the best and most efficient mode of treating the greater part of fractures in the region of the epiphyses and an appreciable number of those involving the diaphyses.—*G. G. Davis.*

A Case of Fracture of the Scaphoid Bone. By Landwehr. *Zeit. für orth. Chir.*, XIX Band, 3. u. 4. Heft.

Supra-malleolar Fractures of the Fibula as a Means of Correction in the Course of Modeling Redressement. By Saxl. *Zeit. für orth Chir.*, XIX Band, 3. u. 4. Heft.

Redressement and the Technic of Plaster Jackets in Severe Scoliosis. By Gottstein. *Zeit. für orth. Chir.*, XX Band.

Author lays stress on the work of Wullstein, and describes apparatus based upon that work. He describes a pressure pad for application on the rib deformity. For plaster he uses such a mixture as suggested by Meisenbach. Report of cases.—*Henry O. Feiss, Cleveland, O.*

A Prothesis for Exarticulations of the Hip-joint. By Nyrop. *Zeit. für orth. Chir.*, XIX Band, 3. u. 4. Heft.

An Apparatus for the Correction of Genu Valgum which is Movable at the Knee-joint and Made of Chrom-leather Strips and Uprights with Spring Extension on the Outer Sides. By Dr. Evler. *Zeit. für orth. Chir.*, XIX Band, 1. u. 2. Heft.

The title explains itself. By means of this brace there is applied constant pressure on the outer side on the upper and lower legs.—*Henry O. Feiss, Cleveland, O.*

An Applicable Curative Jacket for Scoliosis. By Mohring. *Zeit. für orth. Chir.*, XX Band.

Author reviews the apparatus of the past. Description of jacket: It consists of a pelvic girdle, a spinal upright and 2 auxiliary supports. To apply his force, he uses an elastic belt and pressure pads. The main application from the elastic belt begins at one of the uprights and passes around the rib prominence. This force is used in such a way on the rib prominence that no lateral pressure can apply.—*Henry O. Feiss, Cleveland, O.*

Report of a Simple and Practical Extension Plaster. By Ghiulamila. *Zeit. für orth. Chir.*, XX Band.

Author describes a simple method for applying extension to the hip-joint, to the knee and to the spinal column. The method is in use in connection with plaster-of-Paris dressings. Article does not permit further abstracting.—*Henry O. Feiss, Cleveland, O.*

Observations on the Treatment of Genu Varum Infantile, with Special Reference to Correction Apparatus. By Zuelzer. *Zeit. für orth. Chir.*, XX Band.

Apparatus consists of a posterior board on which the legs rest and a sliding upright in the middle to which is fastened, by means of a thumb-screw, a clamp fitting over the anterior surfaces of both knees. It is applied twice a day for two hours each, longer for severe cases; or can be accommodated to the sleeping period. It can also be modified to be used for flat-foot or club-foot.—*Henry O. Feiss, Cleveland, O.*

APPARATUS.

A Portable Apparatus for Securing Fixation and Extension while Applying Plaster-of-Paris Dressings. By E. L. Sanderson, M. D., New Orleans, La. *Journal A. M. A.*, May 9, 1908.

Sanderson describes and illustrates an apparatus consisting of shoulder support, sacral rest and fixation supports for both legs, by which traction may be made upon one or both legs while fixation dressings are being applied.

The parts are very ingeniously combined so that the case and shoulder support form a carrying case for the rest of the apparatus.—*John L. Porter.*

The Magnesite Splint. A New Surgical Dressing. By Raymond Russ, M. D., San Francisco, California. *Journal A. M. A.*, February 22, 1908.

In attempting to find a hard, easily applicable coaptative splint that would take the place of the plaster of Paris for surgical dressings and be

more permeable to X-rays, the author has carried out a series of experiments with the oxychlorid of magnesium which acts much like plaster of Paris when mixed with water.

Practically, the reaction is brought about by using crinoline bandages impregnated with magnesite, native magnesium carbonate, the same as plaster-of-Paris bandages are made and soaking them, at the time they are used, in a solution of commercial magnesium chlorid of the specific gravity of 1.250.

The writer finds that the technical difficulties of its use are much greater than with plaster of Paris, as the proportions of each have to be regulated to nicety to insure good results and the initial setting of the magnesium mixture is slower than that of plaster of Paris, though the final or permanent setting is more rapid. He finds the advantages of the finished magnesite splint over plaster of Paris are:

First. Its greater penetrability to the X-rays.
Second. It is much harder and firmer.
Third. It is more tenacious.
Fourth. It can be used for much lighter casts to secure the same strength.
Fifth. It is not affected by moisture.—*J. L. Porter.*

From the Orthopedic Workshop. By Pfeiffer. *Zeit. für orth. Chir.*, XX Band.

(1) Description of a shoe which is reinforced by a lateral steel spring upright running from the heel to the upper. (2) Description of the modified Beely apparatus used for knock-knee so that it can also be used for bow-legs. (3) Description of the leather cravat for the treatment of cervical Pott's disease.—*Henry O. Feiss, Cleveland, O.*

The Normal Anatomy of the Knee-joint in Roentgen Pictures after Inflation of the Joint Capsule. By Dr. G. A. Wollenberg. *Zeit. für orth. Chir.*, XIX Band, 1. u. 2. Heft.

Knee-joint of cadaver used. Lime injected under the patella and into the joint. Formalin alcohol injected in the femoral artery so as to harden the leg. Sections now made through the joints, sagittal sections of one joint, frontal sections of the other. Each section radiographed and the Roentgen picture compared with the sawed section. Pictures from in front shows the lateral semilunar cartilage more prominently than the medial, and so if we see this condition and the free presence of the cartilage shadow in the joint it does not mean, as was formerly believed, an injury to the cartilage.—*Henry O. Feiss, Cleveland, O.*

The Scientific Principles for Designing Shoes, with Especial Reference to Shoes of Youth and Soldiers. By Lengfellner. *Zeit. für orth. Chir.*, XX Band.

The first principle for correct shoes is to use correct individual lasts. The kernel of the whole question is in the correct adjustment of the arch The heel should be broad and low, the axis of the shoe should be straight. As to infants, it is disputed whether they have a developed arch or not. Parents should not urge children to walk too soon. In military shoes, we must once more lay stress upon the arch. The present military shoe is durable but not correct. It is too heavy and its sole is covered with nails which are harmful.—*Henry O. Feiss, Cleveland, O.*

Studies in Shoemaking for Flat Feet. By Nieny. *Zeit. für orth. Chir.*, XX Band.

Author reviews what he considers the important points of an orthopedic shoe. He describes a shoe which he often uses. The essential point is that the corrected arch is provided for by molding the shank on a plaster cast. There is, besides, a Thomas heel and a reinforcement running from the heel forward under the shank. Such shoes are durable and maintain their shape. For the more severe cases of flat feet, insoles are necessary and the advantage of various kinds are set forth. A description is also offered on the manner of taking a plaster cast of the foot with the foot under correction —*Henry O. Feiss, Cleveland, O.*

Technical Novelties. By Gocht. *Zeit. für orth. Chir.*, XX Band.

(1) A plaster bandage table: The idea of this table is to have in a compact and convenient form the appliances and materials for applying plaster-of-Paris dressings. (2) A shoulder splint: This splint is designed to hold the arm abducted at a right angle from the shoulder, the part supporting the arm is attached to a thoracic band which is strapped to the thorax. (3) Flat-foot insoles of hard leather: Author explains their use and describes the technic of making them.—*Henry O. Feiss, Cleveland, O.*

VI. GENERAL AND MISCELLANEOUS, INCLUDING STATIC AND NEUROLOGIC LESIONS AND DEFECTS.

Report and Critique on Apophysitis Tibialis Adolescentium. By Alsberg. *Zeit. für orth. Chir.*, XX Band.

The age for disease changes in the tuberosity of the tibia is between 12 and 14. It almost always attacks boys and usually the right leg. In 8 cases the change occurred in both. It usually comes on gradually and it is seldom to be attributed to trauma. Roentgen pictures show irregularities in the shape of the process and in the breadth of the cartilaginous layer between the process and the diaphysis. The operative findings are various, but the presence of a fracture is not demonstrated.—*Henry O. Feiss, Cleveland, O.*

The Question of Os Tibiale Externum. By Haglund. *Zeit. für orth. Chir.*, XIX Band, 3. u. 4. Heft.

Author takes exception to statements made by Lilienfeld in his article on "So-called Tarsalia, etc," appearing in this volume on page 224, because the latter had claimed that his so-called fractures of the scaphoid are really ossa tibilia externa. He lays significance upon pain as being a cardinal symptom of these juvenile intrachondral fractures.—*Henry O. Feiss, Cleveland. O.*

The So-called Calcaneous Spur. By Haglund. *Zeit. für orth. Chir.*, XIX Band, 3. u. 4. Heft.

Author discusses the subject in relation to an article of Chyrsospathes. He agrees with C. that the spur depends on traction on the muscles, but disagrees on the point that it arises from the epiphysis, believing it arises from the body of the calcaneus. The spur seems to correspond to those bony formations which occur in osteoarthritic processes. In the treatment he gives the patient the choice of an operation or a ring pad to remove the pressure and be worn under the heel.—*Henry O. Feiss, Cleveland, O.*

Remarks on Calcaneus-spur. By Blencke. *Zeit. für orth. Chir.*, XX Band.

The spur on the calcaneus is frequent and does not necessarily cause disability. One, however, which has been harmless for a long while may at the instigation of trauma start an irritative process. A spur may develop in adolescence from the point of the epiphysis. Such cases show them on both feet. This occurs in the minority of cases. It mostly develops in later years and varied causes play a rôle in its formation, including gonorrhea, arthritis and arteriosclerosis. That all spurs are not derived from the epiphysis is proven by the fact that they do not always develop in the direction of the epiphysis and because spurs may occur at various other points. Spurs that occur unilaterally suggest that they are true pathologic formations, such as exostoses or osteophytes. They are due to tendencies to which the whole body is disposed but which finds their manifestation in the foot on account of constant irritation due to walking and standing. Therefore, we cannot be correct if we state that there is only one cause for spur formation.—*Henry O. Feiss, Cleveland, O.*

Plantar Exostoses of the Heel. By Lehr. *Zeit. für orth. Chir.*, XIX Band, 3. u. 4. Heft.

Trauma is not a necessary cause, the disease picture belonging to the general category of flat-foot. The question is, whether the spur corresponds to such bony formation as we often find near the epiphyseal lines resulting from the pull of muscles and ligaments; in other words, is it a true exostosis or is it simply an accentuated formation of the processis medialis tuberis calcanei? In the former instance, the exostosis would point in the direction of the pulls as we actually find to be the case. On the other hand, it is possible that with a developed flat-foot and the rolling of the os calcis a bony process normally present might produce the symptoms. Author believes that the two possibilities are combined and that the combination brings about severe pain. In the operation the important point is to preserve the plantar fascia as much as possible, but as it is absolutely impossible to preserve it completely, the after-treatment must include a support for the arch. —*Henry O. Feiss, Cleveland, O.*

Zur Frage der Behandlung von Rupturen der Quadriceps femoris. By T. Karewski. *Deut. med. Woch.*, 1907, No. 28.

In the case quoted by Karewski the muscle was torn immediately above the patella. The general condition of the patient was so bad that an operation was considered inadvisable. The treatment consisted of adhesive plaster strips pulling together the torn ends of the muscle. The result was excellent.

The Line Connecting the Trochanter with the Anterior Superior Spine as a Diagnostic Guide. By Schoemaker. *Zeit. für orth. Chir.*, XIX Band, 3. u. 4. Heft.

Patient lies on his back and the connecting line is drawn from the tip of trochanter to the anterior superior spine and is continued to the mid-line of the body. This line has no distinct relation to the navel, because the position of the latter is variable, but in all normal patients the corresponding line on the two sides must strike the mid-line at the same point. If we picture a horizontal line connecting the tips of the trochanters, then the two triangles thus formed are right-angled isosceles triangles. The diagnostic value of this line is chiefly in the unilateral hip lesions, although it may be useful in the bilateral cases, because the vertical leg of the triangle would change in ratio to the horizontal leg.—*Henry O. Feiss, Cleveland, O.*

The Why and Wherefore of Idiopathic Deformities in Adolescence. By Bohm. *Zeit. für orth. Chir.*, XX Band.

Author's summary: Disturbances in growth, such as scoliosis, coxa vara, pes valgus, genu valgus adolescentium, which take place in the period of development of the human individual in an idiopathic manner, are not to be explained in the manner accepted at present. The assumption of weight-bearing directed in an abnormal manner as a primary cause of such deformities does not seem tenable upon the grounds of clinical experience. On a basis of earlier research, we hold it to be proven that the numerical variations of the trunk skeleton represent the essential idiopathic factor in scoliosis idiopathica adolescentium. Comparative anatomy shows us that idiopathic growth deformities of adolescence, such as coxa vara, pes valgus, and genu valgum are physiologic developments in the lower and higher apes. Based upon these facts, it seems highly probable that deformities idiopathicæ adolescentium of the lower extremity represent genuine variations from a specific growth type of the genus homo (phylogenetic developmental anomalies), and this in the sense of an incomplete adaptation to the specific human function of the lower extremity. The later clinical manifestations of these youthful idiopathic disturbances find their explanation in the peculiar physiologic post-natal form development of the human skeleton.—*Henry O. Feiss, Cleveland, O.*

Artificial Deformation of the Lower Jaw. By Dr. B. Spitzer and Dr. R. Werndorff. *Zeit. für orth. Chir.*, XIX Band, 1. u. 2. Heft.

Author cites observed cases which suggest the query whether external influences constantly applied to the lower jaw affect only the alveolar part or also the body, the angle and the joints of the jaw. The question also presents itself as to how great a force is necessary to bring about the first apparent changes. Experiments being carried out in animals. Too early to report results. Attention called to the necessity of using great care in the application of head supporting apparatus, as the cure of one evil may result in another.—*Henry O. Feiss, Cleveland, O.*

Trigger-finger. By Arthur Hiller. *Zeit. für orth. Chir.*, XX Band.

Chief symptom is interference with flexion or extension. Review of literature. Report of a case: In the operation the tendon was exposed and there appeared a spindle of circular rings. These were removed. Result good. Author states that the three etiologic factors of trigger-finger are rheumatism, unusual strain and trauma.—*Henry O. Feiss, Cleveland, O.*

A New and Bloodless Method for Treating Syndactylitis in the Newborn. By Hornung. *Zeit. für orth. Chir.*, XX Band.

A review of the earlier proceedings by the open methods. Author reports an apparatus used by Dr. Spitzy. It consists of 2 prisms which may be approximated by means of thumb-screws. One edge of each prism rests in the furrow between the fingers and by gradually tightening the screws the two edges are approximated. Finally the fingers are divided. Description of case in which this method was used. Length of treatment depends upon the age of the patient. For cases where there was bony syndactylitis author suggests subcutaneous osteotomy previous to the application of the prisms.—*Henry O. Feiss, Cleveland, O.*

Kinematographic Study of the Normal Gait and Several Disturbances of Gait. By Frankel. *Zeit. für orth. Chir.*, XX Band.

Normal Gait.—General description.

Congenital Dislocation of the Hip.—The peculiarities of this limp rests in the lack of resistance about the joint and upon the lessened function of the abductors of the hip.

Coxa Vara.—The gait is waddling. The pathognomonic signs are the adduction position, the swinging movement due to outward rotation in the forward swing, the persistence of the prominence of the trochanter and the tendency to the Trendelenberg symptom.

Coxitis.—The characteristic signs are the dragging gait on the one side and the hopping gait on the other, the tendency being for the weight of the body to rest upon the healthy leg.

Gait in Several Types of Paralysis.—The characteristic sign is the co-operation of the upper extremities in compensation for the inhibited function of the trunk and leg muscles.

This article is of extreme value as offering an important aid in the study of the gait and in suggesting to other workers a scientific method for studies along the same line.—*Henry O. Feiss, Cleveland, O.*

Reports on the Development and Symptomatology of Flat-foot. By Mayer. *Zeit. für orth. Chir.*, XX Band.

Flat-foot is a disproportion between static requirements and static capacity. By the use of the laws of the lever, author attempts to elucidate the disproportion from a mathematical point of view, suggesting one formula to show the relation between the pressure and the length of the arch and another formula showing the relation of the length of the arch to the pull of the tendo achillis.—*Henry O. Feiss, Cleveland, O.*

Congenital Supination Disturbance. By K. Cramer. *Zeit. für orth. Chir.*, XX Band.

Supination of forearm is interfered with by the abnormalities of muscle or nerve, through change of the bones, or, from another point of view, the disturbance may be either intrauterine or postfetal. Congenital disturbances are to be anatomically classed under 4 heads: 1st, Partial or complete absence of one bone; 2d, proximal lengthening of the radius; 3d, anchylosis of forearm at humerus; 4th, fusion of the radius and ulna with the hand pronated.

Report of cases and review of literature. In the treatment, resection of the upper end of radius is often indicated.—*Henry O. Feiss, Cleveland, O.*

Report on Hyperplastic Osteopathy or Osteoarthropathies. By Chrysospathes. *Zeit. für orth. Chir.*, XX Band.

Description of a not yet classified type. Author reports a case of abnormal thickening of the upper extremities. The thickening involves the shoulder-blades, the upper arms, the upper half of the lower arms, the first and second left metacarpus and the first phalanx of the left thumb. Considerable restriction in motion. Telangiectatic spots in the skin of the shoulders. On the occiput, there is a hard swelling the size of an apple, and an exostosis in the neck somewhat interferring with swallowing. The urine shows a diminution of phosphorus. The author tries to classify the case according to such groups as acromegaly, dyschondroplasia, osteitis deformans and other bone diseases, but is unable to show a relationship of his case to those groups.—*Henry O. Feiss, Cleveland, O.*

The Results of Osteotomy of the Femurs. By Guradze. *Zeit. für orth. Chir.*, XX Band.

Object of article is to demonstrate the usefulness of osteotomies. There is hardly a deformity of the hip, thigh, or knee in which osteotomy cannot be of benefit, and there is no operation in which the result is so quick and so manifest both to patient and outsiders. We bring about an artificial fracture, establish with the help of our technic a new and better functionating position and finally maintain the position with plaster; then we rely on the transformation law of Wolff and in a few months the bone is changed and its trabeculæ so formed that they can carry body weight in the correct manner. A deformed and limping cripple is changed to a man who stands and walks erect. In technic nothing new is offered. Cases are reported illustrating excellent results.—*Henry O. Feiss, Cleveland, O.*

Osteotomy or Osteoclasis. By P. Bade. *Arch. f. Orthopedica Unfall Chir. und Massage.* Band, V, H. 223.

Osteoclasis has the same advantages over osteotomy that a simple fracture has over a compound fracture, furthermore it is a much quicker operation and consequently shortens greatly the period of anesthesia.

The time of the consolidation of the fracture is also less after osteoclasis and the period of after-treatment considerably shorter; there is also no danger from nonunion. Blanchard has reported over a thousand cases of osteoclasis without an untoward result.

The advantages of an osteotomy are the use of simple instruments, ability to localize the fracture exactly and to succeed in producing a fracture in every case no matter how old or how young, how soft or how brittle the bones may be, and the ability to produce at will a simple linear, a wedge-shaped or a Z-shaped fracture. The wedge-shaped resection is held by Bade to possess no advantages over the linear.

Two cases are cited to illustrate typical advantages for both operations. The first a young woman of 27, with the severest grade of knock-knee imaginable. She could not stand upright when the patellæ were made to look forward and the internal condyles to touch the feet were separated by 90 cm. She walked only a few steps by flexing the knees and crossing them over one another. Linear infracondylar osteotomy followed by immediate correction. Extension and internal rotation resulted in a perfect cure.

The second was a rachitic child with corkscrew-like limbs and arms. The legs were held twisted around one another in an almost inconceivable fashion. Being without an osteoclast at the particular place the patient was, the limbs were straightened out by hand by bending them over the edge of a table and were fully corrected except for a marked bowing of the femurs just above the condyle. Later on the child was placed in a hospital and a supracondylar osteotomy was done. (This last case is supposed to show the limits of an osteoclasis.)—*Walter G. Stern, Cleveland, O.*

Prophylaxis Against Cripples. By Rosenfeld. *Zeit. für orth. Chir.*, XX Band.

Author goes over the causes and the frequency of occurrence of cripples from a general point of view. An important point in the prophylaxis of bone and joint tuberculosis is the early professional treatment best carried out in proper localities. Special stress is laid on altitude, heliotherapy, the proximity to the sea, thermal baths in connection with land colonies and convalescent homes in the woods. The program of our endeavor in the

future for the care of cripples must be broadened considerably. According to the signs of the times it will be for the orthopedic surgeon to take up this important part of social work and to bring it to a solution from the point of view of the welfare of the people.—*Henry O. Feiss, Cleveland, O.*

The Present Status of Homes and Asylums for the Cure and Education of Cripple Children. By Rosenfeld. *Arch. f. Orthopädie. Unfall Chir.und Massage.* Bd. V, H. 2 and 3.

In Middlefraukonia in 1904 a census showed approximately 6 per cent. of the population could be classed as cripples, of which number but 25 per cent. were children, 64 per cent. were males and only 6 per cent. of the children and 9 per cent. of the adult cripples were mentally deficient. A large percentage, however, had never had any educational advantage, had never learned any trade or handiwork, and most of the cripples were not self-supporting, but were dependent upon others for support.

Up to the beginning of the 19th century the lot of the indigent cripple was a hard one, they were the cursed of God. In ancient times they were either killed or cast out, in the Christian era they became buffoons, targets for rude jest and sport, public or royal fools and jesters or beggars and hardly differentiated from the blind or insane. In 1832 the first school and asylum in the history of the world was opened by Johann Nepomuk in Munich. Here cripple boys were educated and taught a trade. This school grew slowly, but the idea it represented rapidly spread all over the world, but in every case the initiative came from private individuals, the state taking no active part in founding or managing such institutions.

The first "State" hospital for the care and education of cripple children was founded in St. Paul, Minn., by the State of Minnesota as the "Minnesota State Hospital for Cripple and Deformed Children," under the management of Dr. Arthur J. Gillette. This has been followed by other States and governments, but in 1906 America still led the world in this respect.

A detailed account of each institution of Europe and America is given with the distinct acknowledgment that these institutions are incomparably more advanced and more complete in every detail in the United States than in any other country in the world. This question of founding such homes and asylums is one of vital interest for the State. In Germany every cripple who is not entirely self-supporting costs the state at least 1100 marks annually, thus, to have taught every cripple a trade in his childhood and to have rendered him self-supporting would have meant a present yearly saving of 150,000,000 marks to the German government. The future work must rest with the government and not upon private charity.

Such institutions must have a four-fold purpose:

1, as sanitorium for treatment;

2, as school for education;

3, as trade school;

4, as asylum for the helpless and the indigent.

As the usual orthopedic treatment generally requires months and years of time, functions 1, 2 and 3 go hand in hand. The elementary studies which are persisted in alone for at least eight years in the "grammar" schools must here be supplemented early with practical instruction in a trade or craft, for the chief endeavor must not be to merely give the cripple an education, but to make him self-supporting. The trades usually taught to be successfully pursued in later life are bookkeeping, husbandry, tailoring, cabinetmaking, watchmaking, bookbinding, cobblery, tinkering, broom-

making, basket weaving, weaving of all kinds —rugs, carpets, etc.; for girls, sewing, darning, crocheting, knitting, embroidery, lace making, mending, etc. The experience of the Widener Memorial Institute of Philadelphia shows that more stress should be laid upon husbandry than upon all other trades. This, too, has a distinct hygienic value.

It has been shown that at least 90 per cent. of all the pupils who had graduated from these institutions in the last twenty-five years were self-supporting.—*Walter G. Stern, Cleveland, O.*

Gampsodactyly. (Claw-foot.) By L. Chevrier. *Archives Gén. de Méd.*, March, 1907.

The author discusses at length a deformity of the feet, usually bilateral, characterized by hyperextension of the first phalanx on the metatarsal, with secondary flexion of the inter-phalangeal joints. It is further distinguished from hammer-toe in that all the toes are generally affected. The foot often is widened in front from abnormal separation of the metatarsal heads, causing valgus of the first four toes and varus of the little toe, well shown in radiographs. Torsion of the toes also occurs. The extensor tendons are in prominent relief. Calluses surmount the first inter-phalangeal joints. A variable degree of *pes cavus* coexists. In weight-bearing the toes may or may not touch the floor. The articulations themselves are not affected, and by passive motion the claw can usually be opened by first reducing the hyperextension of the first phalanx. For the latter reduction an upward pressure under the metatarsal heads is generally necessary; in old cases the maneuvre is not always successful. In rare cases a cutaneous band unites the balls of the toes with the ball of the foot and prevents opening of the claw. There may be complete voluntary reduction, or merely reduction of the flexion by contraction of the interossei. As to subjective symptoms there are sometimes awkwardness in gait and pain due to stretching of ligaments when metatarsals are widely separated.

Gampsodactyly and pes cavus are rarely seen the one without the other. Thus the former accompanies practically all cases of club-foot. Other local lesions, as burns and ulcers may cause the deformity. Certain general conditions may be responsible: "arthritism," "rheumatism," hysteria, etc. But often enough no organic defect can be detected. Careful examination will reveal the condition in eight to ten per cent. of all cases, considerably more common among males, rare before the fifth year; i.e., before development of the plantar arch; thereafter equally common at all ages. When appearing during adult life it is always an acquired deformity; may be due to contractions from burns, fractures or ulcers, or there are no local lesions, the origin being obscure ("idiopathic"). In childhood it appears in connection with congenital pes cavus and is then probably due to a *relative* shortening of the extensor tendons. When due to acquired conditions, as hysteria or infantile paralysis, there is a *real* shortening of the extensors. The "idiopathic" cases have been ascribed to wearing of narrow shoes, but the middle as well as the outer toes are involved, and the malformation is often hereditary. They are thus probably congenital and they are likely due to a *congenital shortness of the extensor tendons.* No deformity is apparent until the normal flat-foot of infancy develops its plantar arch; the insufficiency of the extensor tendons then produces gampsodactyly. In favor of this theory is the rarity of gampsodactyly in flat-feet. The pes cavus is not here a cause, as it is in club-foot, but an added feature of the deformity.

Treatment depends on the etiology. In club-foot it is usually sufficient

to correct the greater deformities. In the reducible, idiopathic cases the heads of the metatarsals should be raised by a support worn in the shoe. For cases not completely reducible tenotomy of the extensors; in irreducible cases generally tenotomy with forcible manipulation. Bone operations are generally not advisable.—*Roades Fayerweather.*

The Neurologic Position on Spastic Paralysis and its Treatment by Nerve Plastic. By Spitzy. *Zeit. für orth. Chir.*, XX Band.

Author reviews the indications for nerve transplantation in such cases. He reports 3 cases in which he claims distinct improvement in function. Case I was a spastic paralysis of the left half of the body. The arm could only be extended at the elbow without much effort. The lower arm and hand were in a position of extreme pronation which could not be corrected. The fingers were flexed. Author did a partial central transplantation of the medial nerve into the radial, conveying it through a tunnel made of a hardened dog artery. The other two cases were similar in their clinical aspect and the author did the same kind of operation.—*Henry O. Feiss, Cleveland, O.*

Arthrodesis and Tendon Transference in Paralytic Club-feet. By John P. Lord, M. D. *Surgery, Gynecology and Obstetrics*, Vol. VI, April, 1908, No. 4.

The author takes up the operative measures as against the use of braces for paralytic club-foot, and reaches these conclusions:

"I. Arthrodesis after resulting ankylosis holds the ankle stiff and immobile. The increase of flexibility in the anterior articulations of the foot will compensate for the loss of motion in the large articulations of the tarsus. The foot is thus permanently held in a right-angle position.

"II. If all the muscles of the leg are paralyzed, resulting in a flail joint, the production of a stiff ankle and tarsus is the only practical procedure if the foot and ankle are to be made to sustain the body weight.

"III. Tendon transference, in addition to arthrodesis, appropriating to best advantage the remaining muscles, enables us to secure the best possible results.

"IV. Patients should have the benefit of such treatment as soon as the extent of the paralysis is determined.

"V. Great advancement has taken place in this branch of surgery."—*Edward S. Hatch, New Orleans.*

An Interesting Example of the Orthopedic Surgery of the Hand. By F. de Beule. *Ann. de la Soc. Belge de Chir.* 1907, Januar. *Abst. Zentralbl. f. Chir.*

A four-year-old boy presented a severe claw hand, incapable of function, due to contraction of the extensor tendons, following an inflammation of the back of the hand two years before. Operation disclosed a mass of scar tissue embracing the entire back of the hand, from which it was impossible to isolate any tendon. De B. extirpated the entire mass, straightened the fingers (for which it was necessary to resect the head of the third metacarpal), and united the corresponding ends of each tendon, which were separated 3 cm. from each other, by two silk sutures. There was a good functional result in 4 months, so that ordinary articles could be held well and the active motion of the fingers justified the hope of further improvement. *David Silver, Pittsburg, Pa.*

Mechanical Modeling Redressment of Flat-foot by Means of a Flat-foot Osteoclast. By Fred Schultze. *Arch. f. Orthop.* Bd. VI. H. 1.

Schultze has devised an osteoclast (the reverse of his club-foot osteoclast), in which the necessary force is obtained from the leverage of the osteoclast, but in which the force is applied through the hand, which is encased in a sort of boxing-glove. The operation is completed when the foot can be brought into the desired position without the use of any force whatsoever. The foot is converted into a club-foot and is fixed in this position.

For the exact description of the machine consult original work.—*Walter G. Stern, Cleveland, O.*

The Treatment of Severe Flat-foot Deformities after Adolescence. Prof. Dr. F. Schultze. *Zeit. für orth. Chir.*, XIX Band, 1. u. 2. Heft.

Flat-foot in later years should be corrected by redressment. Lengthening of the tendo achillis should always be done in advance. A correct shoe with a strengthened arch and a rubber heel is necessary. Author advises several pairs of shoes which should be carefully kept according to the prescription and should always be at hand. The open method of treatment is only justified if the more conservative treatment has not been successful.—*Henry O. Feiss, Cleveland, O.*

Flat-foot; A Mechanical Problem Solved by an Ideal Plate, Simply Constructed and Allowing Natural Motions in the Foot. By J. E. Tuckerman, Cleveland. *American Medican, October*, 1907.

Author's attention is called to the fact that high heels relieve temporarily early symptoms of flat-foot by taking weight off of the longitudinal arch, but at the expense of the transverse arch; tight shoes, also then, give temporary relief by keeping the feet from spreading, but bunions, corns, calluses, bursitis, etc., follow, overriding and wedged toes ultimately results. Author contends that any support must come from below, and adds "all methods and endeavors to force in the navicular are wrong." "A broad-based shoe is best, but in mild cases the patient may be allowed to follow the follies of fashion."

"Ridged plates or anything solid as a support are a damage, jarring the spine. The ideal plate in the ideal shoe is obtainable."

Any method of taking a record of the foot by making a cast, he says, is faulty, as the foot in its pathological position is longer than the foot would be if there were no lowering of the longitudinal arch, therefore any support made to fit such a cast would be much longer than the foot when properly supported. He claims that no matter how careful we might be, accuracy is impossible.

He says that plates can be made according to tracings which are simple, requiring little time of the patient or physician, and are more accurate than other methods.

He advocates his method for making support from tracings instead of from casts, and describes the way in which German silver, which he uses, is treated.

The following is his method: "Let the patient, while seated, place both feet on a sheet of paper, trace the outline of the projections of the foot, the pencil held perpendicular to the paper and touching the foot. Then repeat, allowing the pencil to trace under as far as possible. This gives the tracing of the foot at rest. Change the paper and repeat with the patient standing. This gives tracing while sustaining the body weight. Take weight of

patient and size of shoe. Note position of calluses, inflamations, etc. These, while not so essential, aid the mechanic who fills the order."

He describes vividly his method of determinations of a proper support from the data obtained, and of making plates by "peneing" German silver, so as to give just the proper support and elasticity. One of the most important points, he claims, as to the adoption of such material, is that within forty-eight hours an imprint of any undue pressure is left on the plate, and any fault may be immediately rectified. As improvement takes place in the foot, such a plate can be easily changed.

His summary: "Flat-foot occurs according to definite mechanical laws based on anatomical structure and physiologic actions, and must be treated in accordance with these laws.

"It is primarily a sinking of the longitudinal arch, with concomitant eversion of the anterior two-thirds of the foot; complicated by secondary ailments as 'rheumatic' or vague pains in the arch, knees or back; corns, bunions, Morton's toes, hammer toes, etc.

"High-heeled and tight shoes afford only temporary relief and aggravate the secondary ailments.

"The remedy is a plate made along anatomic lines to support the foot from below while allowing physiologic action.

"The material best suited is German silver, being easy to work. An advantage claimed for the German silver is that it gives on its polished surface an imprint accurately indicating where alteration need be made.

"The best method of ordering a plate is from tracings of the bearing surfaces of the foot and not from casts or other time-consuming and inaccurate methods.

"The method of shaping the plate in the anvil by 'peneing' is so carried out as to insure durability.

"The plate is self-retaining, supporting the arch while allowing by its shape, tapered ends, elasticity, and accurate fit, the necessary conditions for ultimate recovery to natural action of the foot, a spring tread followed by grasping the ground with the toes as the body weight is carried over them.

"That the constant use of the plate does not damage the foot but aids the upbuilding of the arch is proven by the fact that the foot soon finds the plate too long. With the heel fixed by the shoe the imprint in time shows the pressure to be confined to the anterior part and not distributed evenly over the plate as when first fitted. The arch has regained some of its tone and the plate must be modified, raised and shortened and often narrowed to meet the new requirements."—*John Dunlop, Washington, D. C.*